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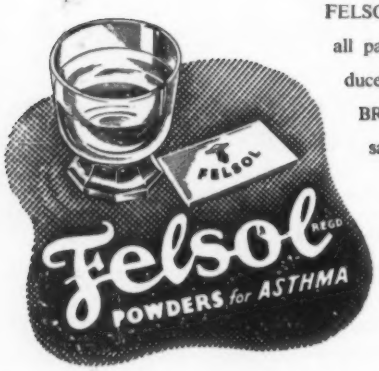

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CONTENTS

THE WHOLE OF THE LITERARY MATTER IN THE LANCET IS COPYRIGHT

ORIGINAL ARTICLES

Noradrenaline in Hypotensive States and Shock
Prof. U. S. VON EULER, M.D. 151

The Treatment of Pulmonary Tuberculosis
J. G. SCADDING, F.R.C.P. 154

Premature Induction of Labour in the Treatment of Hæmolytic Disease of the Newborn
G. A. KELSALL, M.B.
G. H. VOS 161

The Anti-thyroid Effect of Phenylbutazone
M. E. MORGANS, M.R.C.P.
W. R. TROTTER, M.R.C.P. 164

Excretory Function of the Liver
W. H. HORNER ANDREWS, D.M. 166

Studies on the Anti-tumour Activity of *p*-di-(2-Chloroethyl) Aminophenylalanine (Sarcolysine)
L. F. LARIONOV
A. S. KHOKHLOV
E. N. SHKODINSKAJA
O. S. VASINA
V. I. TROOSHEIKINA
M. A. NOVIKOVA 169

Streptococcus pyogenes Infections in a Hospital
PHYLLIS ROUNTREE, D.SC. 172

Chlorpromazine as an Aid to Cooling in a Thyroid Crisis
A. R. HUNTER, F.F.A. R.C.S. .. 173

Argentaffinoma (Carcinoid Tumour) with Cyanosis
IAN FRASER, F.R.C.S.I. 174

Irradiation Nephritis
W. G. SMITH, M.R.C.P.E.
A. WYNN WILLIAMS, M.D. 175

MEDICAL SOCIETIES

Heberden Society 177

REVIEWS

Notices of Books 178

IN ENGLAND NOW

A Running Commentary by Peripatetic Correspondents 195

LEADING ARTICLES

DESIGN OF HOSPITALS 179
REACTIONS AFTER TRANSFUSION 180
THE DEATH PENALTY 181

ANNOTATIONS

Nitrofurantoin 182
Glossopharyngeal Breathing 182
Disaster at Ascot 182
Dental Services 183
The Action of the Parathyroid Hormone 183
Experimental Tumour Chemotherapy 184
The Hospitals of Perthshire 184

SPECIAL ARTICLES

Family Doctor and Health Visitor
Sir SELWYN SELWYN-CLARKE, F.R.C.P. 185

Bone Structure and Metabolism 186

Non-interchangeable Gas-cylinder Valves 186

Effects of Atomic and Hydrogen Bomb Explosions 187

General Medical Council 187

Medical Research Council 188

Superannuation Rights Overseas 189

PUBLIC HEALTH

The Health-department Psychologist
DENNIS G. PICKLES, M.A. 189

Meat Pies 191

Poliomyelitis Vaccination 191

IF I WERE. . . .

If I Were Director-General of UNICEF
CICELY WILLIAMS, F.R.C.P. 192

LETTERS TO THE EDITOR

Muscle Imbalance in Scoliosis (Dr. D. B. Allbrook) 196

Gastric Atrophy Preceding Pernicious Anæmia (Dr. D. L. Mollin) 196

Gastrectomy in a Hæmophiliac (Mr. M. G. Eldin, F.R.C.S., Dr. E. T. Bassadone) 196

Staffing the Transfusion Service (Dr. A. P. Prior) 197

Acute Infective Polyneuritis (Dr. C. P. Petch) 197

Leukæmia in Ankylosing Spondylitis Treated with X rays (Dr. I. Churchill-Davidson) 197

Treatment of Status Epilepticus (Dr. P. J. Williamson) 197

The Micro-environment of Inflammation (Dr. Noel Alder) 198

Poliomyelitis and Tonsillectomy (Dr. I. M. Librach) 198

Observer Error (Dr. J. L. Boldero, Dr. K. Lumsden) 198

Lung Cancer and Smoking (Mr. N. W. Pirie, F.R.S.) 198

Treacle for Constipation (Mr. D. Lang Stevenson, F.R.C.S.) .. 198

Merrygowhimbles (Mr. John Potter, F.R.C.S.) 199

Vitamin B_{12} in Uræmia (Dr. Debabrata Pal) 199

Clinical Tests of Passive Joint Sense (Dr. J. Lee, Mr. K. Browne, M.A.; Dr. S. Renfrew) 199

The Bombs (Dr. S. Sevitt) 199

PARLIAMENT

Drop in Consumption of Welfare Foods 193

Dentists' Remuneration 194

Question Time 194

MEDICINE AND THE LAW

An Overlooked Swab 201

OBITUARY

Henry Tregelles Gillett 202

NOTES AND NEWS

The Vincent Square Laboratories 202
The Renal Circulation 202
Treatment of Anthrax, Botulism, and Snake-bite 203
Dangerous Drugs 203

University of London 203
University of Birmingham 203
University of Glasgow 203

Appointments 204
Births, Marriages, and Deaths ... 204

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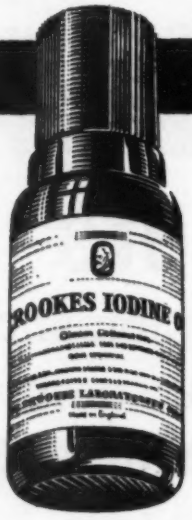

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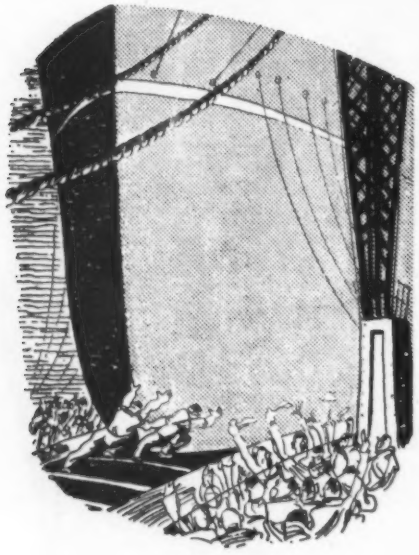

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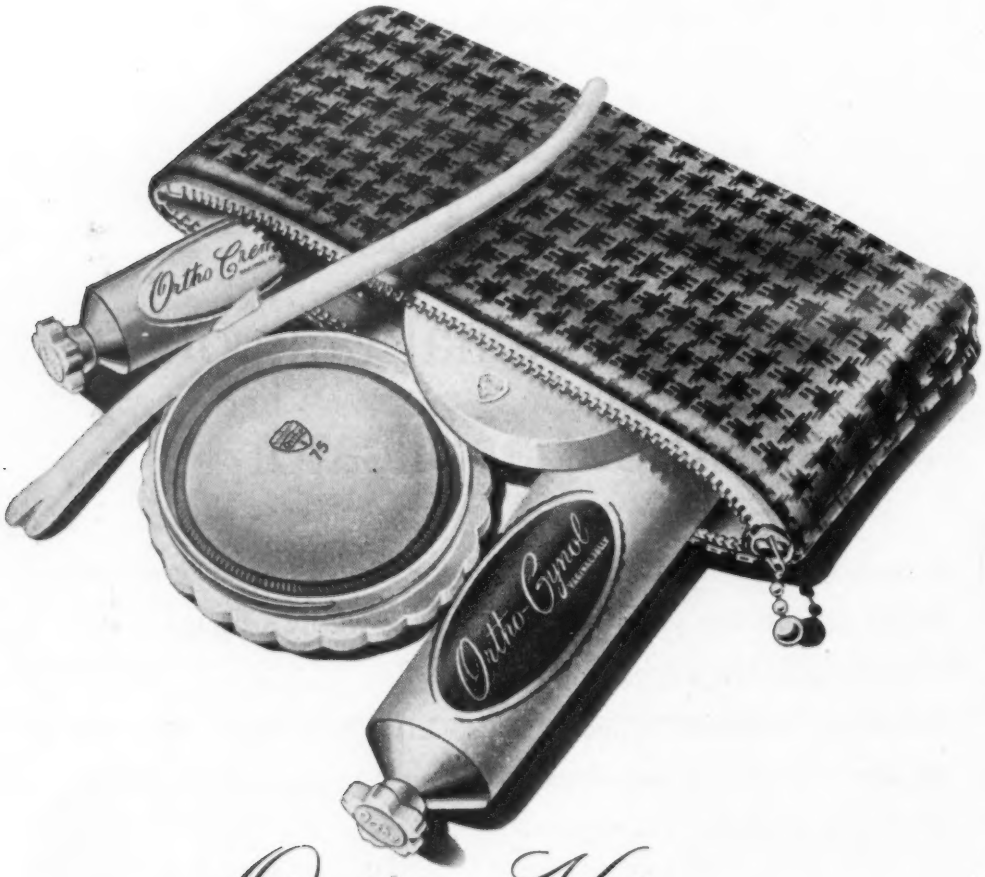

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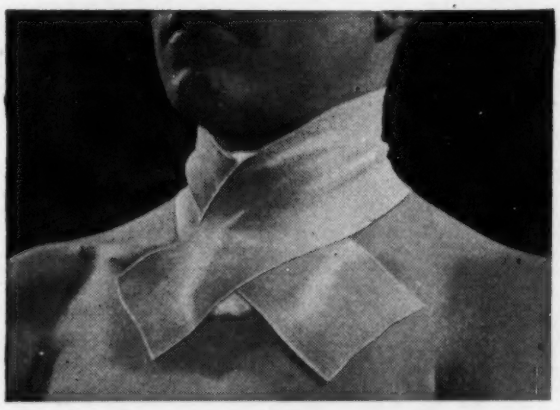

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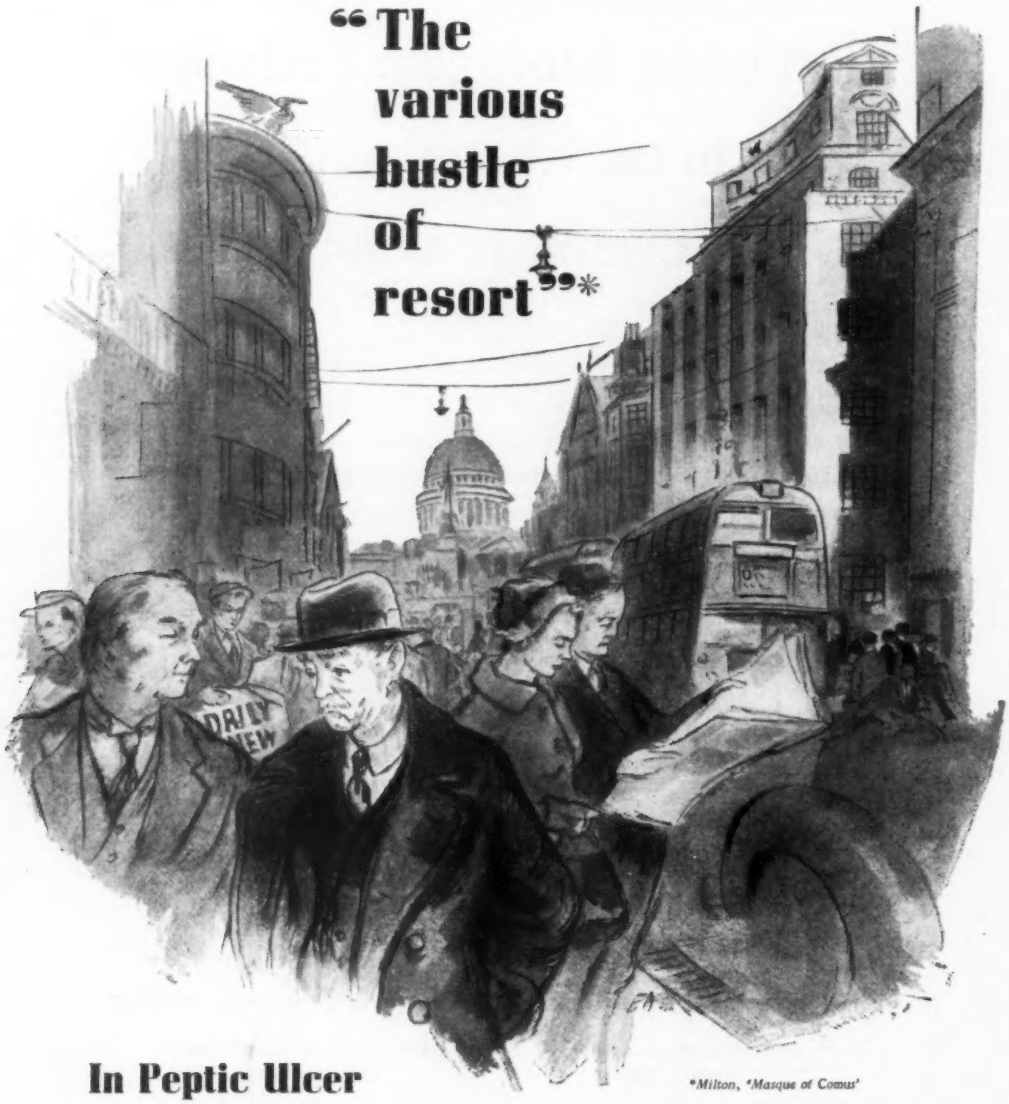

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SUMMARY OF STUDY ON SUCCINATE-SALICYLATE THERAPY *

A succinate-salicylate combination was found superior to acetylsalicylic acid in rheumatic states both on grounds of therapeutic efficacy and lower toxicity. Adequate amounts of the former could be administered with more lasting effect and with fewer and milder side effects. Furthermore, succinate-salicylate affects the disease process itself, as well as relieving painful symptoms and does not abnormally increase prothrombin time even after prolonged dosage.

* *Delaware State Medical Journal* (1954) **26**, 22.

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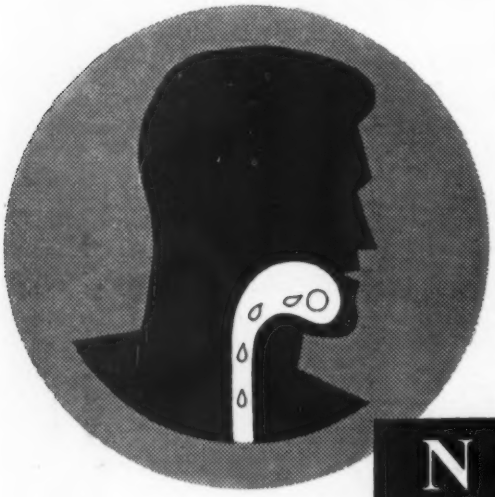

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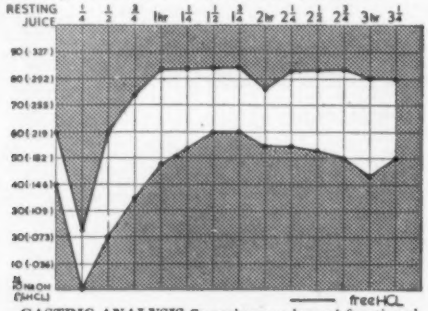

GASTRIC ANALYSIS Superimposed gruel fractional test-meal curves of five cases of duodenal ulcer

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Ambulatory Continuous Drip Method in the Treatment of Peptic Ulcer. *Amer. J. Dig. Dis.* March 1955, **22**, 67-71

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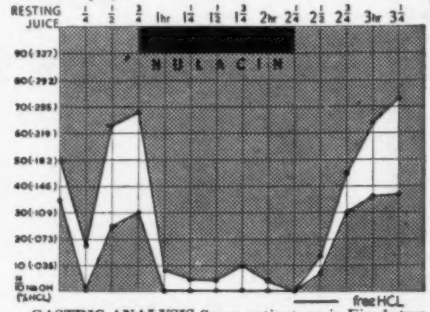

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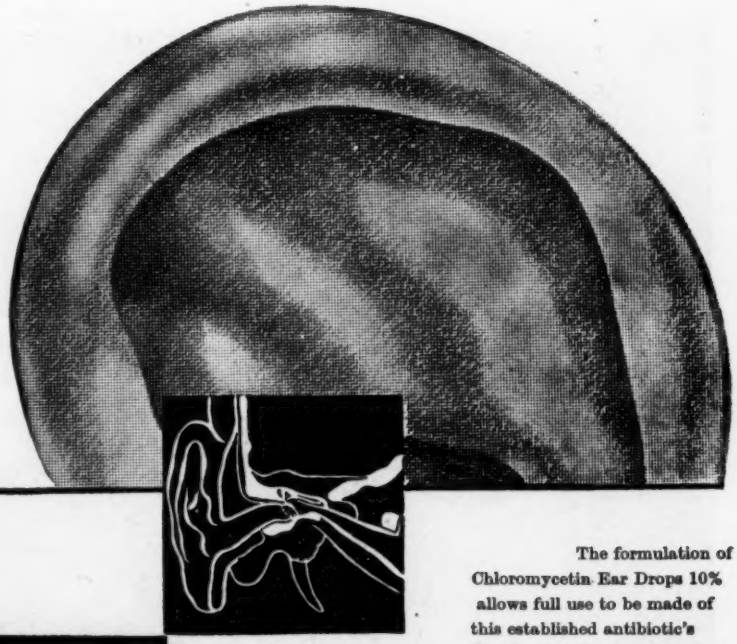

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"Treatment of Chronic Otorrhœa and Chloromycetin"
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"Local Application of Chloramphenicol"
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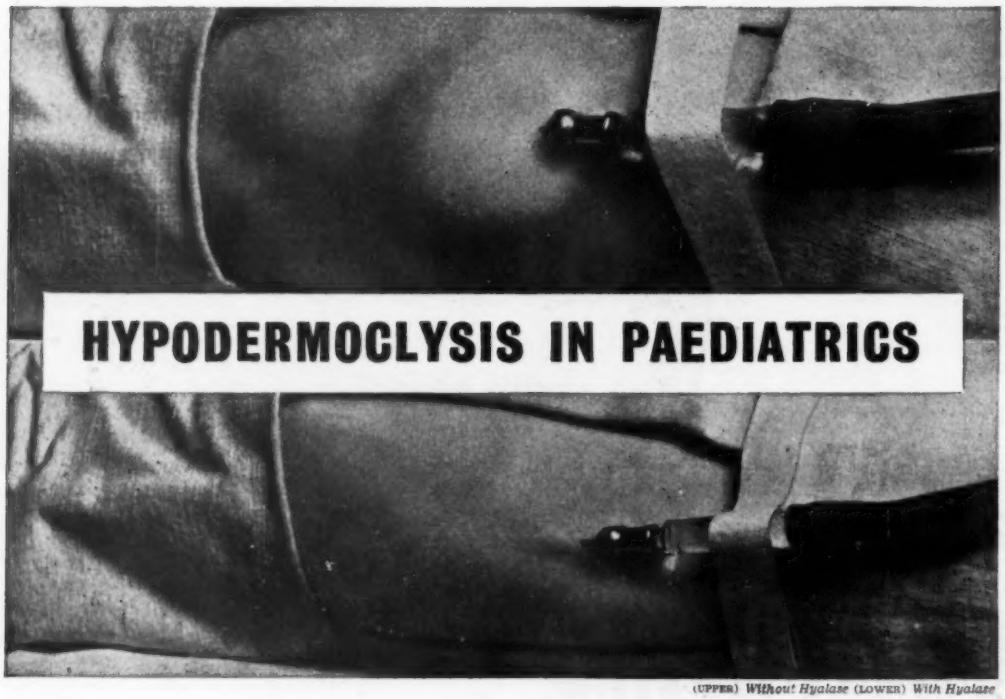

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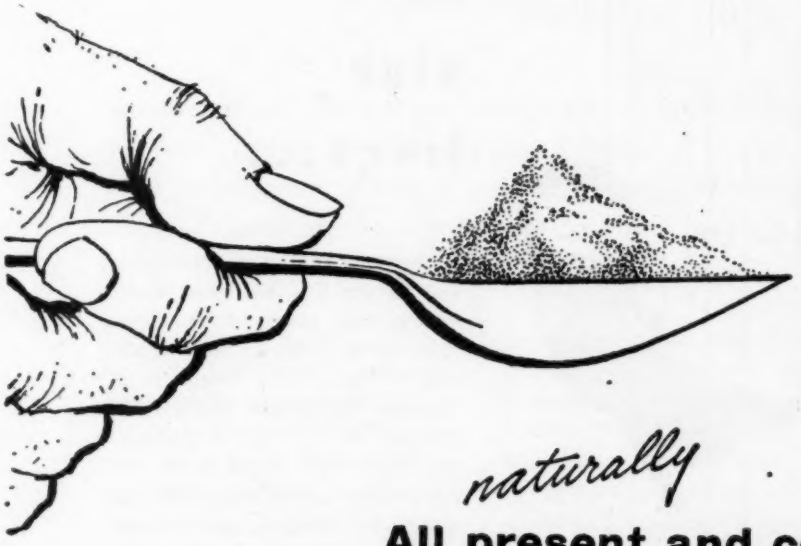

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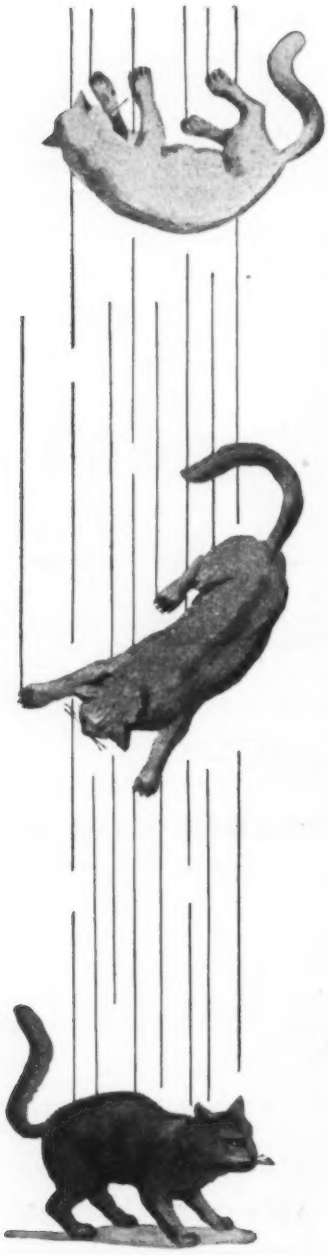

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[1] *Lancet, 1951, ii., 749*
[2] *Jour. Aviation Med., 16 : 59, 1945*

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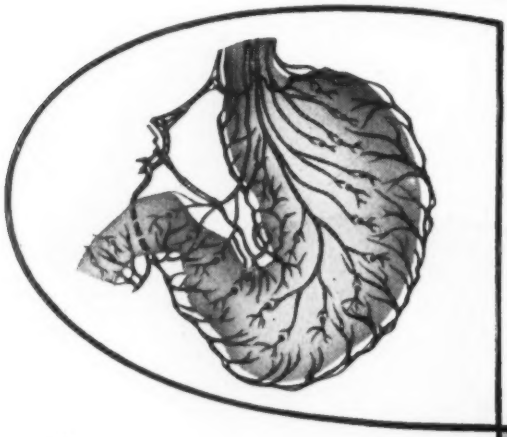

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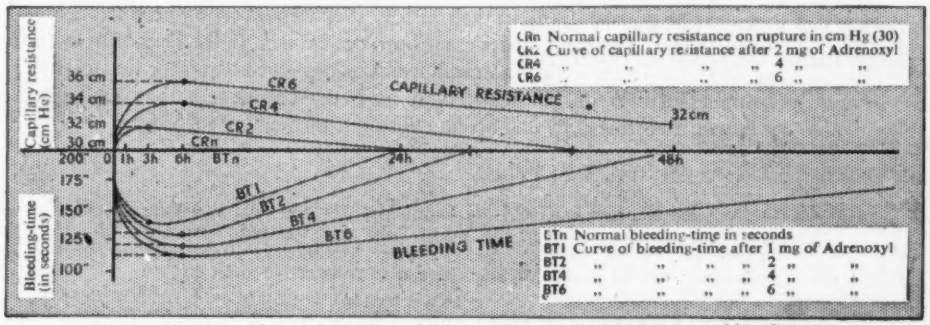

This graph gives evidence of the effect of Adrenoxyl on capillary resistance and bleeding-time

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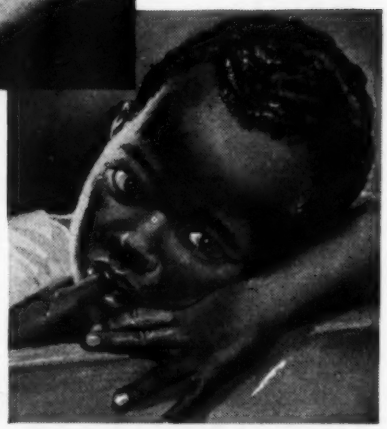

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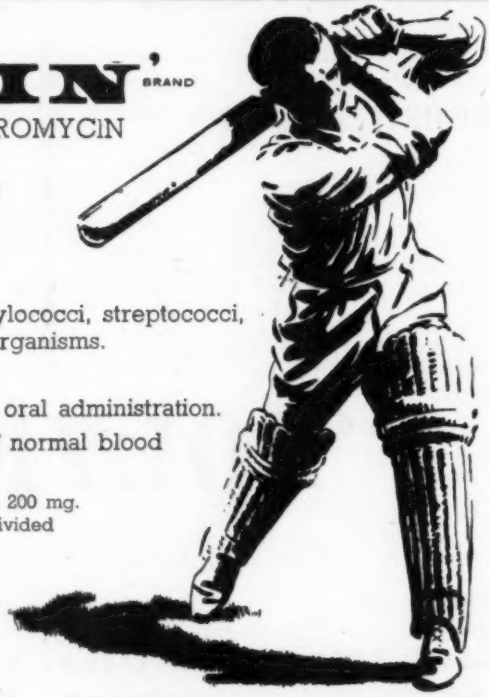

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NORADRENALINE IN HYPOTENSIVE STATES AND SHOCK*

PHYSIOLOGICAL ASPECTS

U. S. VON EULER
M.D. Stockholm
PROFESSOR OF PHYSIOLOGY, UNIVERSITY OF STOCKHOLM

NORADRENALINE does not seem to have been used as a remedy before 1948, in spite of the fact that it was synthesised already in 1904 by Stolz, and recommended for therapeutic use by Biberfeld in 1906. Stolz pointed out that the drug had strong pressor actions and that it apparently was less toxic than adrenaline. This was further emphasised by Biberfeld, and apart from the suggested use as a pressor drug he proposed its use as a vasoconstrictor in local and spinal anæsthesia.

In attempting to obtain a background for the understanding of the therapeutic actions of noradrenaline and an idea of its possibilities in this respect, it would clearly be helpful to consider its physiological properties and actions as well as the conditions under which it is released. Although the picture is by no means complete it appears justifiable to state that we now have a fairly clear idea of the physiology of noradrenaline.

Occurrence and Distribution

As adrenergic nerve transmitter noradrenaline is a regular constituent of the postganglionic sympathetic (adrenergic) nerves and occurs for this reason in all organs supplied with such nerves (Euler 1946, 1951). After degeneration of these nerves noradrenaline largely disappears in the corresponding organ, showing that no other source of importance is present. On regeneration of the nerves noradrenaline reappears in the organ (Goodall 1951). From the amounts present in an organ, such as the spleen, and its nerve-trunk, we have reasons to assume that the actual content in the nerve-endings is rather high. Moreover, resynthesis must occur at a rapid rate, since even during prolonged stimulation of these nerves the transmitter is released at an undiminished rate, and the organ maintains its content.

The adrenergic nerve-supply is chiefly directed to the vascular bed; consequently the vascular wall is relatively rich in noradrenaline (Schmiterlöw 1948). There are large differences in the relative nerve-supply to the vessels in different regions as reflected by the noradrenaline content of various organs. Thus the organ content may indicate the number of noradrenaline-producing fibres to the corresponding organ. There also seems to be a certain relationship between the supply of adrenergic fibres, as judged by the noradrenaline content, and the sensitivity of the vascular bed to the drug in different organs. While the vessels of the spleen, the skin, certain glands, the heart, and the kidneys are relatively rich in constrictor fibres and respond vigorously to noradrenaline, other organs such as the lungs, the brain, the liver, and voluntary muscle contain a smaller number of vasoconstrictor fibres and also give a weaker response to noradrenaline.

Noradrenaline is also a regular constituent of the adrenal medulla (Holtz et al. 1947). The relative amounts of adrenaline and noradrenaline vary widely, however, between different species. In adrenal glands from man about 16% of the catechol amines are noradrenaline. The total amount of noradrenaline in both adrenal glands in man is 1–2 mg., which is considerably less than the amount present in other organs.

Actions

The circulatory actions of noradrenaline are the most conspicuous ones and also form the most important basis for the therapeutic application of the drug. Important contributions as to its circulatory effects have been made by several research groups. It was shown by Goldenberg et al. (1948) that noradrenaline raises the systolic and the diastolic blood-pressure without increasing the cardiac output. This is in contrast to adrenaline, which in physiological doses augments the cardiac output causing only a slight increase in mean pressure. It can be concluded from these observations that noradrenaline raises the peripheral vascular resistance whereas adrenaline actually lowers the total resistance—i.e., causes vasodilatation as a net effect. The explanation of this somewhat unexpected fact is that adrenaline lowers the resistance in certain large vascular areas of the body. Through the important research of Barcroft, Edholm, Greenfield, and their co-workers (see Barcroft and Swan 1953, Whelan 1954) it has been revealed that adrenaline causes vasodilatation of the vascular bed of the skeletal muscle, which, owing to its size, largely determines the over-all effect. Noradrenaline, on the other hand, usually causes vasoconstriction in this area. In the liver a similar difference in action is noted (Bearn et al. 1951).

The vasoconstrictor effect of adrenaline on the skin is even more pronounced than that of noradrenaline. On the kidneys the increase in resistance is about equally large from equal doses of adrenaline and noradrenaline, but considering that the mean pressure is raised considerably more by noradrenaline it follows that the renal blood-flow may be less impaired by this drug than by adrenaline.

The effect of the two drugs on the heart is of particular interest. When tested on an isolated perfused heart both compounds have a similar action, consisting in an increase in frequency and augmented force of the beat. In the living organism the positive chronotropic action of noradrenaline is often masked by a reflex bradycardia. A study of the response of the coronary vessels has shown that both drugs cause vasodilatation in moderate doses, while noradrenaline dilates even in high doses (Smith 1954). The tendency to produce arrhythmia and ectopic excitation is rather less for noradrenaline than for adrenaline. There is good reason to assume that the so-called wasteful O_2 consumption caused by adrenaline is not caused to a similar extent by noradrenaline.

It has not been possible to analyse and compare the effects of adrenaline, noradrenaline, and vasomotor stimulation for each organ, but there is good evidence that noradrenaline, like vasomotor stimulation, causes general vasoconstriction and rise in blood-pressure while the circulatory effects of adrenaline show a widely varying pattern.

The differences in action of noradrenaline and adrenaline on the vascular tree have a counterpart in the clear differences in their metabolic actions. This can be seen, for example, in the total oxygen consumption, which is raised some 20–30% by adrenaline but is virtually unchanged by noradrenaline. A similar difference is noted in the blood sugar and lactic acid, and in other metabolic parameters. The effect on the eosinophils is also many times greater with adrenaline than with noradrenaline. The same is true for the transmission-blocking action on ganglia and skeletal muscle. Equally remarkable is the difference in psychic effects between the drugs; adrenaline causes a feeling of anxiety or apprehension which is not elicited by noradrenaline.

This raises the question of the functional relationships between the sympathetic system and the suprarenal glands. The idea prevailing for many years was that these two systems worked simultaneously and for a common purpose. New evidence has shown, however, that this is not the case; on the contrary the two systems have clearly distinct functions. The conclusion is partly based on analysis of the adrenal medullary secretion under

* The Mitchell lecture, delivered at the University of Belfast on April 13, 1955.

various conditions, and on the production of adrenaline and noradrenaline in the body estimated by means of the urinary excretion.

Release of Medullary Hormones

Analysis of suprarenal venous blood in the cat has shown that when general blood-pressure homœostatic reflexes are elicited—for instance, by carotid occlusion—the adrenal medullary secretion chiefly consists of noradrenaline. Under other conditions such as afferent-nerve stimulation of the sciatic nerve or brachial plexus a larger proportion of adrenaline is secreted. Hypothalamic stimulation causes prevalence of either adrenaline or noradrenaline in the secretion, depending on the site of stimulation (Folkow and Euler 1954) (see fig. 1). Furthermore, insulin hypoglycæmia causes a great increase of adrenaline, while hyperglycæmia after injection of glucose selectively depresses adrenaline secretion (Dunér 1953) leaving the noradrenaline secretion almost unaltered. These results indicate that adrenaline and noradrenaline are released separately—which is not surprising in view of their different actions. The implication is obviously that adrenaline and noradrenaline are released from different cells and that these cells have to be differentially innervated. In fact, recent studies by Hillarp and Hökfelt (1953) and by Eränkö (1955) have

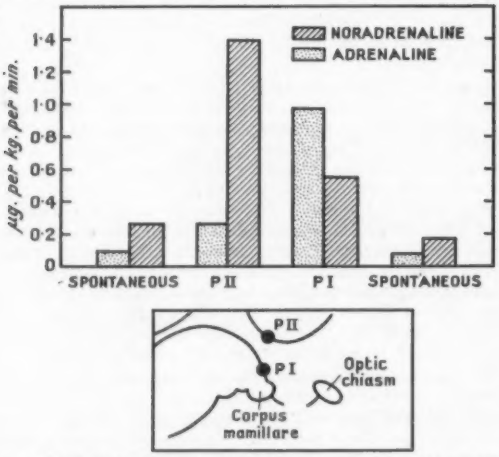

Fig. 1—Effect of hypothalamic stimulation on secretion of adrenaline and noradrenaline from one suprarenal gland in the cat. P I and P II, points of stimulation (Folkow and Euler 1954).

revealed two different kinds of cells in the adrenal medulla, one presumably producing adrenaline and the other noradrenaline.

Excretion of Adrenaline and Noradrenaline in the Urine

The adrenal medullary secretion, unfortunately, cannot be analysed except under rare conditions, and it has therefore become desirable to obtain some other way of estimating the total production of catechol amines in the organism. The estimation of noradrenaline and adrenaline in peripheral blood still presents great difficulties and can hardly be used for systematic studies as yet. However, it is possible to analyse the urinary content of noradrenaline and adrenaline, which gives a relative measure of the amounts released during a certain length of time. Of administered adrenaline and noradrenaline a fairly fixed proportion—about 2–3%—is excreted in the urine. A study of the diurnal variations of the catecholamine excretion has shown that during bed rest the figures are low—2–4 mµg. adrenaline and 8–15 mµg.

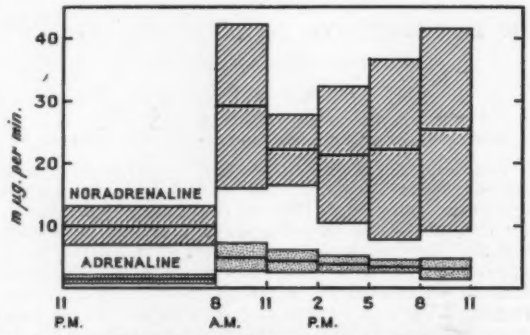

Fig. 2—Diurnal variations of adrenaline and noradrenaline excretion in urine in 9 healthy subjects (Euler and Hellner-Björkman 1955).

noradrenaline per minute (in free form)—while during ordinary daily activities the excretion is about twice as high (Euler and Hellner-Björkman 1955) (fig. 2). Normally the excretion of noradrenaline is far greater than that of adrenaline. Urine analysis has shown that after adrenalectomy most of the adrenaline has disappeared while the noradrenaline is practically unchanged. It can therefore be concluded that the urinary adrenaline is derived from the suprarenals. The noradrenaline must then originate from extra-adrenal sources and presumably from the adrenergic nerves.

Particularly illuminating are the results of blood-pressure homœostatic reflex activity. When a subject is placed on a tilting table and the position is changed from recumbent to head-up at 75° the excretion of noradrenaline is increased considerably more than that of adrenaline (Euler et al. 1955). In the rare cases of postural hypotension the noradrenaline excretion is very low (Luft and Euler 1953).

Strenuous muscular work represents a form of stress which is accompanied by a distinct increase in the excretion of both adrenaline and noradrenaline—up to tenfold. Wada et al. (1935) found that the increase in medullary secretion is more closely correlated with the degree of fatigue or stress than with the actual amount of work performed. The increase in noradrenaline excretion during muscular work may be correlated with the compensatory homœostatic reactions directed against the vasodilatation in skeletal muscle. If a hypertensive patient is subjected to a brief period of muscular work after treatment with a ganglion-blocking agent, such as hexamethonium, he may display a serious fall in blood-pressure and collapse symptoms.

Purely mental stress seems to be accompanied by an increased excretion of adrenaline only.

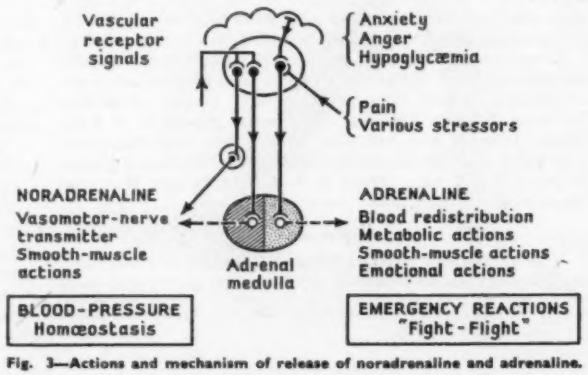

Fig. 3—Actions and mechanism of release of noradrenaline and adrenaline.

Functional Differentiation in the Sympatho-adrenal System

If a theory of the functions of the two physiologically occurring catechol amines is based (1) on their physiological actions and (2) on the conditions of release in the body, the evidence can be summed up as follows.

Adrenaline causes a redistribution of the blood from the skin and the splanchnic region towards the skeletal muscle and the liver with little rise in the mean blood-pressure. In addition it causes a variety of smooth-muscle actions, stimulates several metabolic processes, and elicits characteristic emotional alterations, all serving what has been termed by Cannon emergency functions. The actions of adrenaline are not specially directed towards safeguarding the systemic blood-pressure.

Noradrenaline on the other hand primarily stimulates the heart and constricts all vascular beds, except the coronary vessels which are dilated. Other actions are far less conspicuous and seem to be of less importance. It seems to have a selective effect towards raising the blood-pressure and maintaining blood-pressure homœostasis. In other words noradrenaline appears to be the physiological pressor hormone and adrenaline the fight-fright-flight emergency hormone.

Noradrenaline is reflexly released from the suprarenal medulla as well as from the vasoconstrictor nerve-endings when blood-pressure homœostatic reflexes are elicited by a fall in pressure. Adrenaline, on the other hand, is selectively released during various forms of stress, physical and mental, and during hypoglycæmia (fig. 3).

We may therefore regard the two hormones as two distinct tools, serving entirely different functions. The fact that both stimulate the heart, dilate the coronary vessels, and constrict skin and splanchnic vessels must not be taken as signs of similarity in general function but may only represent instances in which the functional patterns overlap.

Release from Chromaffin-cell Tumours

It was first demonstrated by Holton (1949) that chromaffin-cell tumours contain noradrenaline either alone or together with adrenaline. The release of large quantities of these compounds into the blood-stream is reflected in an increased excretion in urine (Engel and Euler 1950). The excretion may be increased up to a hundredfold, which has become the basis of what appears to be the most specific method of diagnosis of phæochromocytoma. As much as 9000 μg. has been found in the urine per twenty-four hours, probably corresponding to a release into the circulation of about 200 mg. per twenty-four hours.

Apart from its diagnostic value this finding also demonstrates that large amounts of noradrenaline may be continuously released into the circulation without causing grave injury.

In cases of phæochromocytoma, where the release of noradrenaline maintains the blood-pressure at 200 mm. Hg or more, there are often very few other symptoms. Thus the basal metabolic rate and the blood-sugar level may be normal or only slightly elevated.

Noradrenaline in Hypotensive States

The rôle of noradrenaline as physiological vasoconstrictor and pressor hormone suggests that it should be of value in the treatment of hypotensive states and in certain conditions of shock. The use of noradrenaline in this field was inaugurated by Goldenberg et al. (1949) and has subsequently been developed in various directions. Favourable results have been reported in a variety of hypotensive states, but in other conditions the response has been less impressive. It is obviously of interest to find out when refractoriness to noradrenaline occurs and the reasons for this.

In the first phases of hæmorrhagic shock the blood-pressure homœostatic mechanisms are maximally engaged, and it is hardly to be expected that administration of noradrenaline would essentially improve the condition even if it reinforced the effects of endogenously released noradrenaline. Compensation for the fluid loss is often enough to restore the normal circulation in the first phase of hæmorrhagic shock. Unfortunately the condition is not a static one but gradually deteriorates into the irreversible phase, owing to progressive damage to tissues and vessels, partly caused by oxygen lack. Concomitantly the reactivity (Page and McCubbin 1954) of the vessels gradually decreases, manifesting itself in a decreasing sensitivity to noradrenaline and other pressor drugs. The time-factor therefore becomes highly important in the problem of restitution. After a certain time noradrenaline—from the vascular nerve-endings, the adrenal medulla, or the injection syringe—becomes more or less ineffective. If the condition has reached this stage the treatment must follow other lines.

The absolute refractoriness against noradrenaline is, however, preceded by a period of relative refractoriness during which the endogenously released noradrenaline is not sufficient to bring the blood-pressure back to normal. During this stage noradrenaline may be efficient in restoring the pressure. It follows that in conditions of fluid-compensated shock the active pressor therapy must be instituted at an early stage as emphasised by several workers (Shirley Smith and Guz 1953).

Similar conditions may result from toxic influence on the vessels during infections.

It is sometimes argued that the vessels are maximally constricted during shock even after compensation for fluid loss. In such cases the vasoconstriction may largely be apparent only, since the low arterial pressure offers only slight resistance even to a weak vasoconstrictor tone whatever its cause may be. As Burton (1951) showed, the critical closing pressure of small vessels may be considerably above zero.

Under these conditions a large proportion of the blood is pooled in dilated venules or veins and functionally excluded from the circulation. Evidence for this view has been produced by Nylin and Pannier (1947), who found that the mixing time after administration of labelled erythrocytes may be greatly prolonged in shock.

The vascular responsiveness is usually good in other hypotensive states, such as cardiogenic shock, reflex vasomotor collapse, intoxication with centrally acting narcotics, after administration of certain drugs (such as choline esters and ganglion-blocking agents), and after removal of chromaffin-cell tumours. Although the condition may often appear alarming the chances of restoring the blood-pressure and satisfactory blood circulation with noradrenaline are generally good (Churchill-Davidson 1951).

Especially in cardiogenic shock the use of noradrenaline has been recommended by several groups of authors (e.g., Miller et al. 1953). The mechanism of the beneficial action of noradrenaline is probably to be sought in the improved coronary circulation caused by active vasodilatation and by the raised aortic pressure. In this way new collaterals may develop more effectively and contribute to better irrigation of the myocardium.

In the evaluation of noradrenaline as a therapeutic agent it is not always realised that it also serves as the chief adrenergic neurotransmitter of the heart and is a potent stimulator of the heart (Gazes et al. 1953).

Noradrenaline constitutes substitutional therapy in all conditions in which the natural transmitter release is inhibited (vasomotor centre blockade, ganglionic blockade, spinal anæsthesia, neurogenic shock, sympathectomy, postural hypotension). Similarly the hypotension after removal of chromaffin-cell tumours develops as a result of removal of the excess of noradrenaline.

As pointed out above, good vascular reactivity is a prerequisite for the efficacy of noradrenaline. Since the

vessels tend to lose gradually their responsiveness to physiologically released or exogenously added noradrenaline during prolonged low blood-pressure it is obviously of the greatest importance to institute active therapy without delay.

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THE TREATMENT OF PULMONARY TUBERCULOSIS *

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III

IN my first lecture, I touched upon certain trends in mortality and morbidity, and discussed in broad outline those features of the morbid anatomy of pulmonary tuberculosis which are relevant to its treatment. In the second, I dealt mainly with antibacterial treatment. All these problems can, at least in principle, be studied in a precise scientific manner, epidemiologically, in the laboratory or in organised therapeutic trials.

In this lecture I shall discuss medical and surgical collapse therapy and lung resection, which are required only to deal with those cases in which the mechanical factors discussed in the first lecture are interfering, or are thought likely to interfere, with the stable healing of the disease. In other words, these additional methods are applicable only to selected cases of pulmonary tuberculosis—those in which the disease is or has become more or less localised, has not healed or is judged to be unlikely to heal as a result of more conservative measures, and is anatomically and pathologically suitable for the therapeutic measure proposed. About none of these methods is statistically based information concerning efficacy available. Indeed it is doubtful whether in practice such information could be obtained, in view of the great variety of anatomical distribution and pathological type of lesions in pulmonary tuberculosis. Many combinations of different procedures may be called for in dealing with individual patients. It is clearly impossible to hope for statistical appraisal of all of these combinations of procedures; and, especially in a disease so various in its manifestations and natural course, judgment in the choice of therapeutic methods must be based not only upon whatever statistical information is available concerning single methods of treatment of specially defined types of disease, but also upon clinical experience. The published results of those who have applied one or more of these specialised methods to a large number of patients are valuable and informative; but since it is impossible to give the reader complete information about the original state of the patients treated, and since, for the reasons I have already stated, controls are in practice usually not available, these results cannot be of the same value to an experienced physician as the study of his personal cases.

I hope therefore that I shall not be thought to be inconsistent in having referred extensively to the results of large-scale controlled trials in my second lecture, dealing with antibacterial treatment, a method of universal application; while in this lecture, dealing with methods applicable only to selected cases, I shall refer mainly to my own experience of a relatively small number of cases. The number of cases to which I shall refer is indeed much smaller than those in published series; but the figures may have some special validity in that they are based upon the results obtained by methods chosen individually for each case by one physician; and nearly all the patients have been followed by me personally up to the present day.

Artificial Pneumothorax

I shall first discuss artificial pneumothorax, which is at present a subject of some controversy. The frequency with which this measure has been used has decreased remarkably in the past ten years. In some centres its use appears to have been entirely abandoned. I have already indicated that I consider such an extreme view mistaken. There can be no question that in the past excellent results were obtained with artificial pneumothorax. The results which could be obtained are well illustrated by the careful statistical report on the after-results of artificial pneumothorax in patients treated at the Brompton Hospital Sanatorium, Frimley (Foster-Carter et al. 1952). This report is based on the study of 1153 patients discharged from the sanatorium between 1937 and 1942. All of them were followed for at least eight years, only 1% being lost from observation. The series was selected in that it consisted of patients who were treated at the sanatorium, which normally accepted only those who had reached the stage of being ambulant for several hours daily.

Of the 457 patients with cavities treated with unilateral pneumothorax, 69% survived eight years. It was found that the most important factor in prognosis was whether or not cavities had been closed; the presence of pleural adhesions made no difference provided the pneumothorax was effective in closing cavities. 79% of the patients with cavity closure and no adhesions, and 82% of those with cavity closure in the presence of adhesions, survived for eight years; but only 36% of those with adhesions and persistent cavitation. Comparison of the patients treated with pneumothorax with those having disease of similar extent but receiving no collapse therapy showed that a pneumothorax, with or without adhesions, which resulted in closure of the cavity led to a greater expectation of survival than no collapse therapy; but an artificial pneumothorax which failed to close the cavity worsened the prognosis.

The patients who were the subject of this study were treated before antibacterial treatment was available. The results therefore illustrate the possibilities of pneumothorax treatment alone, and indicate that, in combination with antibacterial treatment, artificial pneumothorax still merits serious consideration.

* The Lettsomian lectures for 1955, delivered at the Medical Society of London on April 18, 25, and 27. Lecture II appeared last week.

TABLE I—PLEURAL COMPLICATIONS OF ARTIFICIAL PNEUMOTHORAX, WITH AND WITHOUT ANTIBACTERIAL TREATMENT

—	Without antibacterial treatment (1946–50)	With antibacterial treatment (1950–53)
No. of patients	36	29
No. of A.P.s	41	34
Purulent effusions	3	0
Non-purulent effusions:		
Above diaphragm	7	0
Small	6	3
Obliteration of A.P.	6	5
No. of A.P.s terminated	37	18
No pleural thickening	23	17
Pleural thickening	11	1
Residual encysted effusion	3	0

An important point which seems often to be forgotten is that the advent of antibacterial drugs has led to the setting of more ambitious objectives in treatment. Before the days of antibacterial treatment, the patient who had acute, mainly unilateral, pulmonary tuberculosis would be regarded as having attained a good result if at the end of five years he was clinically well, without signs of active tuberculosis, but with fibrosis and contraction of the affected lung under a thickened pleura. Such results often followed a successful artificial pneumothorax. Since the advent of antibacterial drugs, it has been possible to hope for better functional end-results in such cases. The principal cause of loss of function after pneumothorax was the pleural thickening consequent upon effusion, which was generally said to occur at some time in half the patients treated in this way. This proportion can certainly be greatly reduced by antibacterial treatment.

My own experience of the complication-rate of artificial pneumothorax with and without antibacterial treatment is given in table I. In 41 artificial pneumothoraces induced in 36 patients since 1945 without the use of antibacterial drugs, 10 large and 6 small effusions developed; and of 37 artificial pneumothoraces terminated, 14 were followed by some restriction of lung function by pleural changes. On the other hand, of 34 artificial pneumothoraces induced in 29 patients with antibacterial treatment, only 3 developed transient small effusions; 5 obliterated gradually without effusion, 4 of them without residual pleural thickening. Of the 18 artificial pneumothoraces terminated, only 1 shows slight residual pleural thickening. This indicates that the wise use of artificial pneumothorax in selected cases treated with antibacterial drugs need not be expected to lead to a high incidence of pleural complications and consequent loss of function in the treated lung.

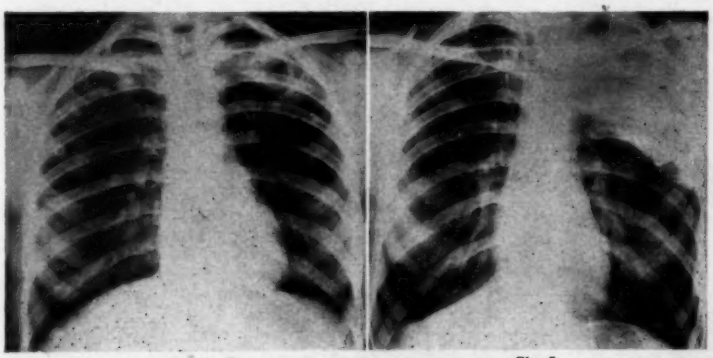

Fig. 4 Fig. 5

Fig. 4—Case 2: Radiograph, Feb. 2, 1950, showing recent cavitated tuberculosis of similar extent in both upper lobes.

Fig. 5—Case 2: Radiograph, Jan. 20, 1955, after treatment by antibacterial drugs, with artificial pneumothorax on the right side, extraperiosteofascial apicolysis with plombage on the left side.

The availability of alternative methods of treatment has certainly diminished the indications for artificial pneumothorax, but I think that there are still circumstances in which this method of treatment is a good one. The cases in which I at present use artificial pneumothorax can be divided into two groups. The first is that of patients with disease involving the upper parts of the lungs, including the apical segment of the lower lobe, of predominantly pneumonic type, with or without cavities, in whom I judge that, while considerable resolution is likely on conservative measures, there is a danger of residual and persistent cavitation. In such cases the use of artificial pneumothorax, after the activity of the disease has been controlled by preliminary rest and antibacterial treatment, may result in healing with a small fibrous scar instead of persistent cavitation which will need surgical measures.

Case 2.—A woman, aged 21, was first seen in February, 1950, when she gave a history of four months' cough and loss of weight. She had evidence of pulmonary tuberculosis of apparently recent origin, mainly pneumonic, but with cavities in the upper parts of both lungs (fig. 4). The sputum contained many tubercle bacilli, the temperature was swinging up to 100°F, and the sedimentation rate was 50 mm. (Westergren). I decided to treat her with antibacterial drugs and then attempt bilateral artificial pneumothorax. She was accordingly started on streptomycin 1 g. and sodium P.A.S. 20 g. daily, and after six weeks an artificial pneumothorax was successfully induced on the right side, and subsequently improved by thoracoscopic division of adhesions. Unfortunately, artificial pneumothorax could not be induced on the left because of adhesions. An unsuccessful attempt was made to close the left-sided cavity by temporary phrenic paralysis and pneumoperitoneum; and when it was clear that this cavity was persistent, it was collapsed by extraperiosteofascial apicolysis and plombage. The right artificial pneumothorax was maintained for three years and re-expanded without complications. After re-expansion, all that could be seen at the site of the original cavity was an insignificant linear scar (fig. 5). The patient remains well.

There is little doubt that if pleural adhesions had not interfered with the original intention of treating both lungs with artificial pneumothorax, an even more satisfactory result would have been obtained, for the original disease was of almost exactly the same extent and type in both lungs.

The second group is a rather heterogeneous one, of odd problems for which artificial pneumothorax seems to be the only reasonable solution. These are mainly in patients with extensive disease, many of whom will have received treatment of various other sorts in the past. The common feature is that they have an awkwardly placed area of cavitation, which has developed in pneumonic disease of fairly recent onset. In such cases, an artificial pneumothorax in conjunction with antibacterial treatment will often result in healing of the cavity into a fibrous scar, with or without a small encapsulated caseous residue. The only alternative that can be offered to the patient in this type of case is conservative treatment, continued for a very long time, with antibacterial drugs, which is unlikely unaided to cause safe closure of the cavity.

The results obtained in the patients whom I have treated since 1946 with artificial pneumothorax are summarised in tables II and III. Table II shows the results in 36 patients, of whom 5 had bilateral artificial pneumothorax, treated before antibacterial drugs were in general use. Of the 2 patients who have died, one died from progressive pulmonary tuberculosis before antibacterial drugs were available; the other died more recently,

TABLE II—RESULTS OF ARTIFICAL PNEUMOTHORAX WITHOUT ANTIBACTERIAL TREATMENT, 1946–50

No. of patients		36
(with bilateral A.P.	5)	
Deaths:		2
Pulmonary tuberculosis	1	
Pulmonary tuberculosis with bronchitis and asthma	1	
Further treatment later:		11
Surgical collapse on same side	1	
,, ,, on opposite side	1	
A.P. on opposite side with antibacterial treatment	2	
Antibacterial treatment for spread of disease ..	7	
Present condition of 34 surviving patients:		
Fit for full work (1 still has A.P.)		29
Fit for light work (1 still has A.P.)		3
Unfit for work		2

as the result principally of severe chronic bronchitis and asthma, although the tuberculosis had become active again and was not responding to antibacterial treatment. 9 of the patients have later had antibacterial treatment for various reasons, 2 have later had surgical collapse treatment, and 2 have had artificial pneumothorax on the opposite side. The results are, I think, satisfactory in relation to the type of disease treated, and to the general prognosis at the time they came under treatment. Table III shows the results obtained in the 29 patients treated with initial administration of antibacterial drugs. It will be seen that the results are, up to the present, extremely satisfactory, especially as 5 of the patients had bilateral artificial pneumothoraces, and 7 more of them were of the complicated type which constitutes my second group of indications for artificial pneumothorax. Only 1 has required any additional form of treatment; but of course they have been under observation for a relatively short period, ranging from one to five years.

Phrenic Paralysis and Pneumoperitoneum

Pneumoperitoneum, with or without phrenic paralysis, has been used for about twenty years. One of the most striking features of its history is the very great variation in the frequency with which it has been used in different centres, and the equally striking difference in policy between different physicians in relation to its combination with temporary phrenic paralysis. My own opinion in this matter is that it is only by accident that pneumoperitoneum alone can produce a useful mechanical result. If it happens that the changed disposition of the thoracic contents produced by elevation of both sides of the diaphragm results in kinking and blockage of a bronchus leading to a cavity, cavity closure may result. This, however, is a very chancy matter, and I do not believe that it happens very often. On the other hand, the combination of phrenic paralysis with pneumoperitoneum does result in some degree of selective relaxation of one lung, and this relaxation is exerted principally on the lower half of the lung, especially its posterior part. I agree entirely with my colleague, Dr. Livingstone, who has recently (1955) stated that he has never used pneumoperitoneum without phrenic paralysis.

The complications of pneumoperitoneum are few. Phrenic paralysis, however, even of the type produced by crushing the phrenic nerve and intended to be temporary, suffers from the disadvantage that paralysis or paresis may prove to be permanent, especially in cases in which a considerable rise of the diaphragm has been maintained with a large pneumoperitoneum. This may be of little disadvantage when the treatment has been applied for disease affecting the lower lobes of the lungs, but where the disease has affected the upper lobes the presence of permanent diaphragmatic paralysis or weakness may be a considerable disadvantage if surgical treatment eventually becomes necessary. Accordingly, my current indication for the use of phrenic

TABLE III—RESULTS OF ARTIFICAL PNEUMOTHORAX WITH ANTIBACTERIAL TREATMENT 1950–53

No. of patients		29
(with bilateral A.P.	5)	
Deaths		0
A.P. previously induced on opposite side without antibacterial treatment	2	
A.P. used in conjunction with surgical collapse on opposite side	4	
Further treatment required later (lobectomy for unclosed cavity)	1	
Present condition of patients:		
Fit for full work (14 still have A.P.)		27
Fit for light work (1 still has A.P.)		2

paralysis and pneumoperitoneum is as an adjunct to antibacterial treatment in patients with disease of such distribution that surgical collapse therapy or resection involving the upper lobe is unlikely to be required in the future. These patients fall into two main groups The first is composed of those with acute disease involving the lower lobes. In them, the relaxation produced may be sufficient to enable acute pneumonic disease to heal without the formation of cavities, leading to effective clinical cure; and even if, eventually, lower lobectomy is required, the diaphragmatic paralysis which may be present is not disadvantageous.

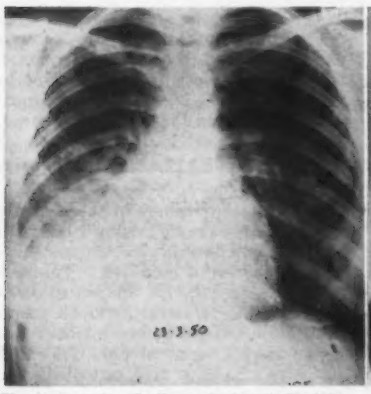

Fig. 6—Case 3: Radiograph, March 23, 1950.

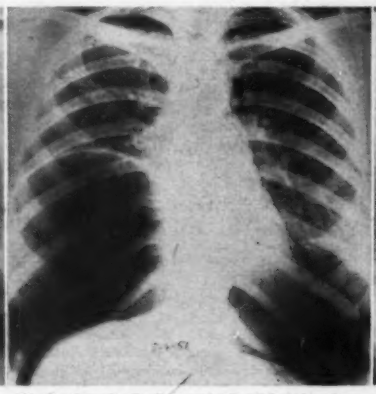

Fig. 7—Case 3: Radiograph, April 5, 1951, after antibacterial treatment, phrenic paralysis, and pneumoperitoneum.

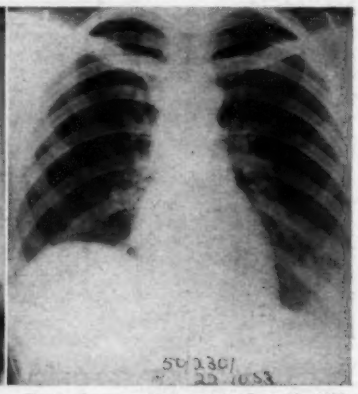

Fig. 8—Case 3: Radiograph, Oct. 22, 1953. Pneumoperitoneum absorbed.

TABLE IV—RESULTS OF PHRENIC PARALYSIS AND PNEUMOPERITONEUM, INDUCED 1946–53; ALL CASES

—		Present state		
		Fit for work	Fit for light work	Under treatment for relapse
Total no. of patients (initial antibacterial treatment 30)	42	33	4	3
Complications: Tuberculous peritonitis	1	..	1	..
Treatment intended to be definitive: Completed*	34	26	3	3
Pneumoperitoneum maintained	3	3	..	..
Treatment used as preparation for A.P.	2	2	..	..
Treatment used with A.P. and surgery	2	2	..	..

* This group is analysed further in table v.

Case 3.—As an example, I will quote the case of a girl aged 16 in 1950, when she was first seen with a history of fever for several weeks, cough, and pain in the right side of the chest. She was found to have consolidation of the right lower lobe (fig. 6), tubercle bacilli in the sputum, and fever ranging up to 101–102°F. She was treated with streptomycin 1 g. with sodium P.A.S. 20 g. daily; the right phrenic nerve was crushed and a pneumoperitoneum was induced. The temperature gradually returned to normal over a period of six weeks. She then went through the routine sanatorium course at Frimley, and a year from the beginning of treatment it was clear that the tuberculous pneumonia had substantially resolved (fig. 7). The pneumoperitoneum was maintained for a total of three years, and the patient, in spite of following a régime of life which I should regard as inadvisable for anybody, irrespective of the condition of the lungs, remains very well (fig. 8).

The second group of cases in which I use phrenic paralysis and pneumoperitoneum is composed of those where the disease is rather generalised throughout the lung, and predominantly unilateral; in these, the unilateral selective relaxation of the lung produced by phrenic paralysis and pneumoperitoneum may be of considerable service in assisting antibacterial treatment in the healing of the disease, without the development of persistent cavitation.

Presentation of the results obtained with this form of treatment is exceptionally difficult, since it is so frequently used in combination with other methods in complex cases. Table IV gives some indication of the present state of the 42 patients whom I treated in this way from 1946 to 1953. The complications are few; in 42 patients, I have had 1 who developed tuberculous peritonitis, possibly unrelated to the pneumoperitoneum. Air embolism may occur as with artificial pneumothorax, but I have been fortunate in that none of my patients has experienced this accident. Before antibacterial treatment was available, I used phrenic paralysis and pneumoperitoneum in a few cases as a preparation for artificial pneumothorax. Although there has been less occasion to use it for this purpose more recently, it often proves necessary to adopt further measures later in patients treated primarily by phrenic paralysis and pneumoperitoneum. Table V shows the present state of the 34 patients in whom I used this method with the initial possibility of its proving definitive, and in which the pneumoperitoneum has now been discontinued. No fewer than 12 have subsequently required some further form of treatment. Nevertheless, the end-results have been satisfactory, considering the type of case treated. It is noteworthy that none of the patients treated in this way has died.

Surgical Treatment

Major surgical procedures for the treatment of pulmonary tuberculosis can be divided into two groups, collapse procedures and resection.

Surgical Collapse Therapy

I do not propose, nor indeed would I be competent, to consider technical details of surgical collapse procedures; but I should like to express my personal view about the relative indications for thoracoplasty and the newer plombage procedures, such as that developed by my colleague, Mr. W. P. Cleland (Lucas and Cleland 1950). These latter differ in two respects from previous attempts to secure collapse at the apex of the lung by plombage. First, the plombe is composed of a non-irritant synthetic plastic material; and secondly, the preliminary apicolysis is performed in an extraperiosteo-fascial plane so that a substantial thickness of well-vascularised healthy tissue lies between the plombe and the diseased lung. For these reasons, complications due to the plombe are very much less frequent than with previous plombage procedures.

Both thoracoplasty and plombage are for anatomical reasons best adapted to deal with disease which is localised in the upper parts of the lung. To some extent, they can be regarded as in principle alternative; but plombage will not deal satisfactorily with cavitating disease extending below the upper third of the lung field, so that for this more extensive disease, thoracoplasty is preferable; and on the other hand, more limited disease at the extreme apex can be dealt with very satisfactorily by plombage, whereas the small thoracoplasty which would be appropriate for such a limited lesion may lead to mechanical difficulties between the scapula and the last remaining intact rib. Thoracoplasty has the advantage, which is overwhelming in the eyes of some surgeons, that it does not leave any foreign substance in the patient's tissues. On the other hand, it leads inevitably to some external deformity. The plombage procedures lead to little external deformity, but the risks associated with the insertion of a foreign body into the tissues must clearly be considered carefully. In my own experience these are small. Up to July, 1954, I had had this operation performed for 38 patients, in 6 of them bilaterally. The only complications encountered with these 44 plombes have been infections of the operative space in 2 of them, arising within a few weeks of the operation. These were dealt with by re-operating, removing the plastic balls which had been inserted, and performing thoracoplasty. Both these patients did well, eventually being left with a thoracoplasty which had been performed in two stages; if this operation had been attempted primarily, it would of

TABLE V—RESULTS OF PHRENIC PARALYSIS AND PNEUMOPERITONEUM INDUCED 1946–53 AND INTENDED TO BE DEFINITIVE: PNEUMOPERITONEUM NOW TERMINATED

—	Total	Fit for work	Fit for light work	Under treatment now
No. of patients	34	26	3	3
No. of deaths	0	..	..	..
Initial antibacterial treatment	22	..	..	..
No further treatment	19	19	..	..
Further treatment: Artificial pneumothorax	2	1	1	..
Surgical collapse	3	3	..	..
Resection	3	2	..	1
Antibacterial	4	1	1	2
Refused surgical treatment	1	..	1	..
No recent information	2	..	..	..

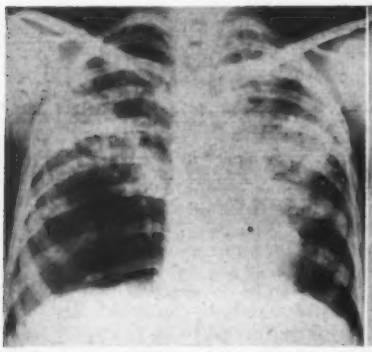

Fig. 9—Case 4: Radiograph, Jan. 14, 1953.

Fig. 10—Case 4: Radiograph, Aug. 7, 1953, after 7 months' antibacterial treatment.

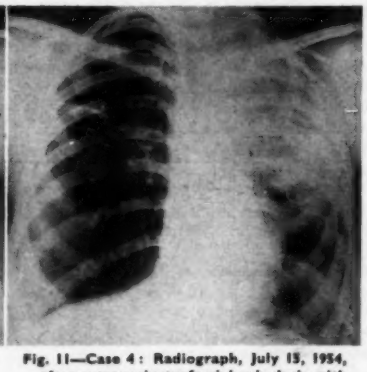

Fig. 11—Case 4: Radiograph, July 15, 1954, after extraperiosteofascial apicolysis with plombage.

course have been done in any case in two stages. The credit for this low rate of complications must go to the skilful and meticulous technique of my surgical colleagues who have performed these operations.

Since becoming familiar with the advantages of this technique, I have selected it for those of my patients in whom I thought that surgical collapse therapy was required to close a tuberculous cavity situated actually at the apex of the lung; the number of cases in which I have had a formal thoracoplasty performed has diminished very considerably, so that in the six years

TABLE VI—INDICATIONS FOR SURGICAL COLLAPSE THERAPY IN PATIENTS TREATED 1946–53

—			Extra-periosteo-fascial apicolysis with plombage (1949–53)	Thoraco-plasty (1946–53)	Total
"Primary"			5	13 (1)	18 (1)
After prolonged medical treatment			17	2	20
—bilateral operations			4 (1)	..	4 (1)
After medical collapse treatment on same side			3	4	7
After bilateral A.P.			1	2	3
Collapse on opposite side	A.P.	present or later	4	..	4
		old	1	1	2
	Extra-pleural pneumothorax		1	..	1
	Phrenic plus pneumoperitoneum		1	..	1
For tuberculous empyema			..	2 (1)	2 (1)
Thoracoplasty converted from plombage			..	2	
Totals			36 (1)	24 (2)	60 (3)

Numbers of deaths in parentheses.

covered by the series of plombage cases which I have already mentioned, I have had only 10 formal thoracoplasties performed, not including the 2 which were converted from plombages.

I consider that much confusion has been occasioned by attempts to compare the results obtained by surgical collapse therapy and by resection. In my view the indications for the two types of treatment are distinct, although there are some cases in which they can be regarded as equally applicable. Surgical collapse therapy is more appropriate for patients whose disease is not strictly confined to one or more bronchopulmonary segments, and particularly for those in whom extensive disease has been treated with initial success by conservative measures, leaving apical cavitation. The type of case which I consider to be suited for surgical collapse but unsuitable for resection may be illustrated by an example:

Case 4.—A woman, aged 26, had felt tired and had lost weight since the birth of her first child a year before her admission to hospital in November, 1952. She was ill, wasted, with fever swinging up to 103°F, and evidence of very extensive tuberculosis in both lungs, with large cavities on the left side (fig. 9). The sputum contained many tubercle bacilli. Antibacterial treatment was started but response to it was delayed; at the end of four months' treatment, the temperature had only just settled, and the radiographic changes showed little improvement. However, treatment was continued, and by July her general condition was sufficiently improved to warrant consideration of measures to close the left apical cavities (fig. 10). Tomography established the absence of detectable cavitation on the right side, and in August, 1953, extraperiosteofascial apicolysis with plastic-ball plombage was performed by Mr. Cleland. This resulted in closure of the cavities and disappearance of tubercle bacilli from the sputum. She went through the routine course at Frimley and has remained in excellent health since (fig. 11).

In my cases the results of surgical collapse procedures, like those of phrenic paralysis and pneumoperitoneum, are difficult to present, because, especially in the case of plombage, they have been used so frequently in combination with other methods, as shown in table VI. The present condition of those treated up to the end of 1953 is shown in table VII. There was 1 operative death among the patients treated with plombage. This patient was desperately ill on admission with very extensive acute

TABLE VII—RESULTS OF SURGICAL COLLAPSE THERAPY IN PATIENTS TREATED BETWEEN 1946 AND 1953

—	Extra-periosteo-fascial apicolysis with plombage (1949–53)	Thoraco-plasty plasty (1946–53)	Tota
No. of patients	35	24	58
Deaths:			
Operative	1	1	2
Later, tuberculous	..	1	1
Further treatment required:			
Completed	3	2	5
Still under treatment	3	0	3
Present state:			
Fit for work	28	19	46
Fit for light work	1	3	4
Well, receiving antibacterial treatment	2	..	2
Convalescent from plombage on opposite side	1	..	1
No recent information—well at last report	1	..	1
Disease active at last report	1	..	1

1 plombage converted to thoracoplasty is counted under "thoracoplasty." 1 patient with plombage on one side and plombage converted to thoracoplasty on the other is included under both, but only once in the total.

tuberculosis and enormous cavities in both upper lobes; she made a very slow response to antibacterial treatment, withstood plombage on one side well, but succumbed shortly after a similar operation on the other side. The 1 operative death after thoracoplasty was also that of a patient presenting a desperate risk, treated before antibacterial drugs were available; the late death after thoracoplasty was that of a patient with extensive pulmonary tuberculosis and tuberculous empyema, complicated by amyloid disease. Taking into consideration the extent and acute character of the disease in many of the patients when they first came under treatment, the results must be considered extremely satisfactory.

Resection

The types of case in which lung resection is especially indicated can be divided into several groups.

First, there is the group of strictly localised disease. This may be either of the bronchial cold abscess type or the residue of localised tuberculous pneumonia. The first group in particular is best treated by resection; and, as I showed in the first lecture, it is frequently possible, by critical radiographic and tomographic studies, to detect the presence of this sort of disease with a fair degree of certainty.

Case 5.—An example is the case of a man who in 1942 had a left pleural effusion, followed by the appearance of localised shadowing at the apex of the left lung in 1945. In 1949 this showed evidence of extension. The tomograms showed two elements in this—a peripheral area, probably of tuberculous pneumonia, and another nearer the mediastinum, suggestive of a lesion of bronchial type. This latter a few months later distended into an obvious cavity (fig. 12). A period of nearly a year of rest, antibacterial treatment, and sanatorium régime resulted in substantial resolution of the tuberculous pneumonia, but the appearance suggestive of localised bronchial disease remained (fig. 13). About a year later still, the bronchial cold abscess distended again (fig. 14), and the apico-posterior segment of the upper lobe was resected (fig. 15).

This behaviour is typical of the bronchial cold abscess. The patient has subsequently developed a spread of disease in the apical segment of the left lower lobe; this has responded well to prompt antibacterial and sanatorium treatment.

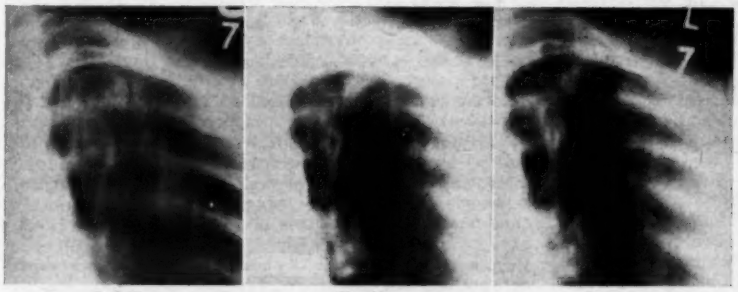

Fig. 12 Fig. 13 Fig. 14

Fig. 12—Case 5: Tomograph, in a plane 7 cm. from the back, of upper part of left lung, Aug. 12, 1949, showing a distended cavity of "bronchial cold abscess" type near the mediastinum and disease of pneumonic type peripherally.

Fig. 13—Case 5: Tomograph at same level, June 20, 1950, showing much resolution of the pneumonic disease, and diminution in size of "bronchial cold abscess."

Fig. 14—Case 5: Tomograph at same level, March 13, 1951, showing enlargement of "bronchial cold abscess."

The localised tuberculous pneumonia which leaves an important caseous residue, especially with evidence of central cavitation, is also appropriately treated by resection. The desirability of resection for such residual cavitating caseous lesions is even greater where the disease is situated in a part of the lung which is unfavourably placed for collapse therapy—for example, the apical segment of the lower lobe.

Tuberculosis affecting the whole of one lobe, and confined to that lobe, is logically treated by resection if effective resolution appears unlikely with even a long period of conservative treatment. It is often a difficult matter, requiring careful study of tomograms in two planes, to decide whether the disease is in fact confined to one lobe; and even if it is, a modified thoracoplasty is usually advisable with resection of an upper lobe.

Fig. 15—Case 5: Resected apico-posterior segment, showing the bronchial cold abscess, and the small well-demarcated caseous residues of the more peripheral tuberculous pneumonia.

More rarely, strictly unilateral disease extending throughout one lung may best be dealt with by pneumonectomy, though here the patient's probable ventilatory reserve after operation should be brought into careful consideration.

Secondly, in some cases in which the disease has been originally extensive but a long period of observation has established the stability of all but a localised cavitating focus, resection may reasonably be undertaken; but I would regard resection as the treatment of election only where the residual cavity is awkwardly placed for collapse therapy, when it may indeed be the only available procedure. If the cavity is apical, although the disease may be successfully treated by resection, thoracoplasty or plombage is equally applicable.

Thirdly, although I do not propose to deal with the treatment of tuberculous empyemata, it is appropriate here to mention that the combination of pleurectomy with resection of the diseased parts of the underlying lung has revolutionised the treatment of this condition. Tuberculous empyema is much rarer than it used to be partly because of the introduction of antibacterial drugs and partly because of the much diminished and more judicious use of artificial pneumothorax. Where, usually as a result of spontaneous pneumothorax occurring in a person with active pulmonary tuberculosis, or as a result of injudicious use of artificial pneumothorax, a tuberculous empyema develops, pleurectomy combined with resection of lung provides a very satisfactory answer to what used to be an extremely difficult therapeutic problem.

Fourthly, tuberculous changes in the larger bronchi are a strong indication for resection, where the disease is so situated that this procedure is feasible. Most commonly there is a stenosis of a lobar or main bronchus. In these cases, provided the rest of the lung is free from active disease, resection offers the only chance of giving the patient continued good health.

TABLE VIII—INDICATIONS FOR LUNG RESECTION IN PATIENTS TREATED BETWEEN 1949 AND 1953

Indication	Extent of resection			Total
	Segment(s)	Lobe	Lung	
Localised disease:				
No previous treatment	14	5	(1)	20
With previous treatment	1	3	1	5
Residua of previous treatment	1	8	3	12
With pleurectomy:				
Acute disease	..	..	2	2
Chronic disease	1	3	..	4
Tuberculous bronchiectasis	..	2	..	2
Total	17	21	7	45
Mortality:				
Immediate	0	0	0	0
Remote tuberculous	0	0	1	1
Remote non-tuberculous	0	1	1	2
Spread:				
Immediate	0	0	(1)	(1)
Remote	1	3	0	4

The case indicated in parentheses is one in which resection was performed on the mistaken diagnosis of carcinoma, the diagnosis of pulmonary tuberculosis being made only postoperatively.

The less common group of extensive bronchial disease which calls for resection is a generalised tuberculous bronchiectasis, involving a lobe. Such cases are rare, but present a remarkable clinicopathological picture. Clinically and bronchographically there may be little to distinguish them from non-tuberculous bronchiectasis; but tubercle bacilli are present in the sputum, and widespread tuberculous changes are found in the affected bronchi.

The indications for which I have recommended resection in 45 patients so treated up to the end of the year 1953 are summarised in table VIII. The present state of the patients treated in this way is summarised in table IX. It is noteworthy that of the 5 patients who have required further treatment, only 1 was in the group of those with strictly localised disease.

Combinations of Procedures

Much of the foregoing discussion will serve to emphasise the point that pulmonary tuberculosis is so variable in its distribution and behaviour that the physician's approach to treatment must be open-minded. In nearly every case it is advisable to begin by a period of conservative treatment with rest and antibacterial drugs, though, as I have already indicated, there are exceptions even to this rule. The persistence of cavitation after more than three months of antibacterial treatment should lead to careful study of the possibility of dealing with this condition either by collapse therapy or by resection. There are two good reasons for considering this without undue delay. The first is that prompt action to deal with such persistent cavities may accelerate the patient's return to normal activities, and, while time spent in securing stable cure of pulmonary tuberculosis must be regarded as a wise investment for the future, the physician should be alert to every possibility of securing that stability in as short a time as possible. The second is that cavities favour the early emergence of resistant bacilli during antibacterial treatment. In patients with originally extensive disease, and in those in whom, during supervision after a successful initial period of treatment, fresh foci of disease appear, many combinations of forms of treatment may be applicable, and it is only by keeping in mind possible combinations of all available methods that the physician will be able to devise the best plan of treatment for the individual patient. The social, economic, and psychological factors to which I referred at the end of the first lecture also have to be weighed in decisions about treatment. In the ability to appraise justly all these diverse factors lies whatever claim the physician may have to skill in his art.

TABLE IX—RESULTS OF LUNG RESECTION FOR PULMONARY TUBERCULOSIS, 1949–53

No. of patients		45
Years elapsed since operation:		
5–6	4	..
4–5	7	..
3–4	10	..
2–3	11	..
1–2	13	..
Deaths:		
Operative	..	1
Later, both non-tuberculous	..	2
Further treatment required:		
Completed	2	..
Still under treatment	3	..
Present state:		
Fit for work	..	37
Fit for light work	..	2
Receiving antibacterial treatment:		
Fit for light work	..	2
Not yet fit	..	1

Sanatorium Treatment

The whole concept of sanatorium treatment has recently come under strong criticism. The older concepts of the function of sanatoria were formulated at a time when prime reliance had to be placed upon the patient's own reparative powers, aided by such help as could be obtained by general hygienic measures. Though these concepts must now be modified, I believe that a well-run sanatorium has an important part to play in the treatment of pulmonary tuberculosis. In particular I think it is a great pity that the treatment of patients with active pulmonary tuberculosis in their own homes, which was forced upon physicians by the post-war shortage of hospital and sanatorium beds, and was then a right and proper policy, has now come to be regarded in some quarters as a procedure of choice. The active stage of the treatment of pulmonary tuberculosis—the stage of bed rest, assessment, and decision about therapeutic policy—should be conducted in a suitably equipped institution, be it town hospital or well-equipped country sanatorium. When the stage of active treatment is completed, my observation of those of my patients who have undergone a period of sanatorium treatment at Frimley, as compared with those who have, for one reason or another, not undergone this salutary discipline, has convinced me of the great value of the graduated and supervised return to full activities, under the best hygienic and environmental conditions, which is one of the principal functions of a good sanatorium.

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PREMATURE INDUCTION OF LABOUR IN THE TREATMENT OF HÆMOLYTIC DISEASE OF THE NEWBORN

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As a result of controlled therapeutic trials in 477 cases of hæmolytic disease of the newborn Mollison and Walker (1952) concluded that (1) exchange transfusion was followed by a significantly higher survival-rate than was simple transfusion, and (2) the premature induction of labour at 3–5 weeks before term was followed by a lower survival-rate than if the pregnancies had terminated spontaneously, but the difference was not statistically significant.

A further analysis of this trial confirmed the previous findings and added the finding, from the follow-up, that after premature induction of labour the infants were more liable to kernicterus and mental or motor defect than those born spontaneously (Armitage and Mollison 1953).

Vaughan et al. (1950) had previously stated a similar general finding, and the same conclusions, expressed with commendable caution, have found their way into a current textbook (Bourne and Williams 1953).

Walker and Murray (1954) publish the results of management of 451 cases of hæmolytic disease of the newborn and claim a very low mortality. They appear to have ignored stillbirths in reaching their conclusion and have discounted "non-viable" cases without defining their criteria of viability. They also repeat the claim of Mollison and Walker (1952) that the premature induction of labour has no routine place in the management of hæmolytic disease of the newborn. Finally, the view condemning premature induction has received official sanction by the Medical Research Council (1952). We therefore conclude that the condemnation of premature induction of labour in hæmolytic disease has now virtually eliminated it from most obstetric hospitals in England and possibly in the United States.

Watson et al. (1954), however, describe the survival of two prematurely delivered infants in two pregnancies of a mother whose previous five pregnancies had produced one abortion and four stillbirths. Anti-rhesus antibodies were found early in the fifth pregnancy.

Comparison of English and Australian Results

In this hospital exchange transfusion has been used almost as a routine since 1945, our conviction that it is superior to simple transfusion being quite definite from the earliest days. We have also practised the controlled premature induction of labour, whenever possible, our constant aim being to reduce the over-all mortality rather than to write off the stillbirths while making a serious effort to save only those born alive. Unfortunately in the confusion of the early post-war years accurate and planned records were not kept. From 1950 onwards, however, this has been remedied, and we can now compare our figures for the past four years with those published by the English workers.

In making any comparisons it must be pointed out that we were, at the time of starting our work, unaware of the rules laid down for the trial, reported by Mollison and Walker (1952), and that we have therefore been unable to apply those rules to our cases. Direct comparison of the two series is therefore hardly valid. There are several differences:

(1) In the English trial two forms of treatment—spontaneous labour and premature induction—were applied in the same hospital, the treatment being decided by opening a sealed envelope before the completion of 36 weeks of gestation. In our cases labour was induced prematurely whenever possible and wherever indicated, spontaneous labour being restricted to cases where circumstances beyond our control precluded premature induction. Our cases, in fact, selected themselves. Although this method of selection is not so satisfactory as the envelope method, the two categories have divided themselves into approximately equal numbers. Furthermore there is no reason to suppose that the English and Australian populations differ as regards their reaction to hæmolytic disease of the newborn; in fact the results of spontaneous delivery in both series are homogeneous (table III).

(2) In the English series premature induction was restricted to 35–18 days before the estimated date of delivery, whereas we have included all induced and spontaneous deliveries after 28 weeks' gestation.

(3) The English series excluded all cases of exchange transfusion in which less than 50 ml. of blood per lb. of body-weight was used. We laid down no minimum but usually gave 150–250 ml. per lb. of body-weight according to serological and clinical indications.

(4) In the English series the rules called for the exchange transfusions to be given within nine hours of birth. We included all exchange transfusions, the longest elapsed time

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being 4 days, but most of them were given within 9 hours of delivery.

(5) In the English series twins and the infants of diabetics and of Wassermann-positive mothers were excluded. Our series has included one or both twins if incompatible, but there were no diabetic or syphilitic mothers. Mollison and Walker (1952) excluded live infants which died before treatment could be given; we have included them. In our series the death of any incompatible infant * born alive has been counted as a neonatal death whatever the cause, provided death took place within 28 days of delivery.

Table I analyses 246 consecutive incompatible pregnancies in mothers whose serum contained abnormal rhesus antibodies against their infants. All losses, both stillbirths and neonatal deaths, have been included despite other apparent causes of death—e.g., hydrocephalus (1 case), staphylococcal pneumonia, toxæmia of pregnancy, tentorial tears, prolapsed cord, and obvious prematurity at about 28 weeks (3 cases). The table shows the period of gestation at delivery, estimated by the attending obstetrician, and the cases are divided into spontaneous delivery and induced delivery, and subdivided into stillbirths, neonatal deaths, and survivals. It becomes apparent that the total wastage in the induced category is not so severe as in the spontaneously delivered cases.

It might be argued that, in the spontaneous cases, the occurrence of 17 stillbirths before 35 weeks unfairly weights the mortality-rate, because practically all the stillbirths between 28 and 34 weeks will be spontaneous. But, since we are considering the treatment of these

TABLE I—MORTALITY-RATES FOR SPONTANEOUS AND INDUCED LABOURS FOR 246 VIABLE INFANTS

Result	Weeks' gestation at delivery								Total		Total wastage
	28–33	34	35	36	37	38	39	40			
Induced labour :											
Stillbirths	1*	1					1†		3	116	15 (*12·9 %*)
Neonatal deaths	1		2	4	3	1	1		12		
Survived	1*		1	33	32	14	10	10	101		
Spontaneous labour :											
Stillbirths	13	4	3	5	1	6	1	3	36	130	45 (*34·6 %*)
Neonatal deaths	2		1		2	2	1	1	9		
Survived			1	6	10	7	6	55	85		

* Toxæmia of pregnancy.
† Prolapsed cord.

cases from 35 weeks or later, and to make the series "comparable" with that of Mollison and Walker (1952), we must exclude all cases delivered before 35 weeks. Table I therefore becomes converted to table II, which shows that the stillbirths in the spontaneous series are still high at 19, but all have now occurred in that period where they might have been prevented by premature induction of labour and exchange transfusion. In the induced cases, although the neonatal deaths were more numerous than in the spontaneous ones, stillbirths were virtually eliminated, the only stillbirth being a case of prolapsed cord and death taking place about half an hour before delivery. Several of the spontaneous deliveries were postmature; but when the cases under our control reached 40 weeks' gestation labour was induced if antibodies were present in the maternal serum, no matter how high the titre.

Table III sets out the results reported by Mollison and Walker (1952) beside those in the present series. The mortality-rate in the two series of spontaneously delivered cases is about 24%, whereas the mortality-

* "Incompatible infant" is one whose mother's serum contains antibodies specifically antagonistic to that infant's erythrocytes, and whose cells give a positive direct Coombs test.

TABLE II—MORTALITY-RATES FOR SPONTANEOUS AND INDUCED LABOURS AFTER 34 WEEKS' GESTATION IN 223 INCOMPATIBLE PREGNANCIES ($\chi^2_{(1)} = 6{\cdot}39$ $\cdot02 > p > \cdot01$)

Result	Weeks' gestation at delivery						Total		Wastage
	35	36	37	38	39	40			
Induced labour :									
Stillbirths					1		1	112	12(*10·7 %*)
Neonatal deaths	2	4	3	1	1		11		
Survived	1	33	32	14	10	10	100		
Spontaneous labour :									
Stillbirths	3	5	1	6	1	3	19	111	26(*23·4 %*)
Neonatal deaths	1		2	2	1	1	7		
Survived	1	6	10	7	6	55	85		

rates of the induced cases are much at variance and in opposite directions, one being much worse, and the other much better, than that of the spontaneously delivered cases. It therefore seems that the management of the premature infant with erythroblastosis gives better results than that of the English workers.

Method of Handling Premature Erythroblastic Infants

Time of Induction of Labour

The time of induction of labour was planned for the optimal moment by very carefully standardised and repeated antenatal titrations of the maternal serum by the antiglobulin method of Coombs (Kelsall and Vos 1952, 1955). Our aim was to leave the fœtus in utero for as long as possible consistent with a harmless antibody titre. We are firmly convinced that, provided the laboratory staff are prepared to take the necessary care and trouble with their anti-globulin titrations, a good working formula can be obtained to guide the team in the choice of the best time to induce labour. If there is any doubt, it is better to induce at any time after 36 weeks' gestation than to allow the pregnancy to proceed to a spontaneous termination. Premature induction must be followed by adequate and early exchange transfusion, and attention must be paid to other important details.

Blood Used in Exchange Transfusion

We have previously drawn attention to the dangers accruing from the use of citrated blood for exchange transfusion (Kelsall and Vos 1952), and Nakasone et al. (1954) and Ames et al. (1950) have confirmed that massive transfusion of citrated blood is dangerous and often fatal (see also *Lancet* 1954). It seems that the premature infant cannot tolerate the perfusion of fluid free from calcium ions, as would be found in citrated blood, and that such a suspension arrests the heart.

TABLE III—TOTAL MORTALITY-RATES OF MOLLISON AND WALKER'S SERIES COMPARED WITH PRESENT SERIES FOR INCOMPATIBLE BIRTHS AFTER COMPLETION OF 34 WEEKS' GESTATION FOR INDUCED AND SPONTANEOUS LABOURS

Labour	Mollison and Walker (1952)						Present series					
	No. of cases	Survived	Died				No. of cases	Survived	Died			
			Neonatal deaths	Stillbirths	Total	Mortality %			Neonatal deaths	Stillbirths	Total	Mortality %
Induced	77	39	22	6	28	36·4	112	100	11	1	12	10·7
Spontaneous	108	82	12	14	26	24·1	111	85	7	19	26	23·4

A heterogenicity test between Mollison's and the present series of spontaneous cases shows no heterogenicity of proportions between survived neonatals and stillbirths.

The cardiac inhibitory effect of calcium lack is accentuated by the rise in the plasma-potassium level, since stored banked blood may contain extremely toxic amounts of potassium. Observations have shown that the perfusion of cold, stored, citrated blood is responsible for the increased venous pressure and irregular cardiac action in exchange transfusion, and that such effects are no longer found if freshly collected, warm, heparinised blood is used. By such means tetany and its precursors, salivation and irritability, are eliminated. Before the present series we lost several infants by using citrated blood, but no infant in the present series has been lost during exchange transfusion since heparin has been substituted for citrate.

It cannot be emphasised too strongly that tetany and cardiac inhibition are, in our opinion, the causes of death in many infants transfused with citrated blood. As a counter-measure some prefer the use of calcium gluconate, but it is usually given "too little and too late," and the primary indications for its use—salivation and irritability—are not recognised in time. The use of calcium gluconate does not obviate the risk of potassium poisoning or the toxicity of citrate per se in stored blood (*Lancet* 1954). We prefer heparin and the elimination of storage. Some workers are reluctant to use heparin because they fear that it may lead to uncontrollable hæmorrhage. Although we have an ampoule of protamine sulphate in readiness as an antidote during and after every exchange transfusion we have never had to use it.

Kernicterus

Kernicterus has become so rare in the induced cases as to be practically never seen. Of some possible significance is the fact that we have tried to exchange at least 150–250 ml. of rhesus-negative blood per lb. of body-weight in every exchange transfusion, and thereby the necessity for repeated transfusion has been minimised. We have aimed at the prevention rather than the cure of jaundice because we have never seen kernicterus unaccompanied by jaundice at some stage. In fact jaundice is seldom seen in our induced infants; they are born and transfused before it has had time to develop. In very severe cases only does mild jaundice appear for a few days in spite of exchange transfusion. Wiener et al. (1948) advocated the use of large volumes of blood in exchange transfusions as an important part of the treatment of erythroblastosis, and Turner (1954) has emphasised the value of repeated exchange transfusions to supply an adequate wash-through of antibodies in the relief of kernicterus. It seems more logical to exchange a larger volume of blood at the initial transfusion than to resort to repetition later.

Sex of Blood

Throughout this work we have deliberately used male donor blood wherever possible for exchange transfusions. In very rare instances were we forced to use even one female donor and one male; but when that happened the female blood was used first, so that male blood was left in the infant. No attempt was made to give all male blood to some infants as controls and all female blood to others; nor was any attempt made to correlate the sex of the blood-donor with the death-rate of the infants. No conclusion is therefore drawn on the point of male versus female blood, though our own conviction should be apparent. We feel that it is irrational to cut the donor pool in half by eliminating males on the unconfirmed evidence of one team of workers who believed that male donor blood was responsible for more neonatal deaths than was female blood. In all our present cases only about 7% of the blood used was drawn from a female source, and it is scattered at random among the cases as they arose, the division being approximately equal in spontaneous and induced cases.

Discussion

We are perhaps fortunate in that we have been encouraged in this work by an actively coöperative department of public health, which has assisted in every way in our antenatal grouping and search for antibodies; by an enlightened general public aware of the dangers of hæmolytic disease of the newborn, and by a very large number of our practising colleagues who have placed their material at our disposal. The success or failure to save the infant of a mother who has been immunised depends very largely on being forewarned of her state early in the pregnancy. Although this has meant that countless tests for antibodies have been made, we have been warned in many of the cases that incompatibility was present by the initial appearance of antibodies or by their undoubted rise in titre. The warning given by such investigations is of incalculable value to the clinician, but many still strenuously deny the value of antenatal titrations in prognosis. We can only say that in our hands they give reliable results if adequate care and trouble are taken with every step in the titration (Kelsall and Vos 1952, 1955). Although we are investigating other antenatal serological tests we find that, for general purposes, the indirect anti-globulin titration (Coombs) provides the measure of the antibody which is responsible for the manifestations of the disease. At least in our laboratory, other methods of titration do not give comparable results to those of the Coombs method.

The over-all mortality-rates given in table II indicate the value of inducing premature labour as opposed to allowing pregnancy to proceed to a spontaneous termination. For a closely comparable number of cases in each category, the number of deaths in the induced cases was not only less than half that in the spontaneous deliveries but also was considerably less than the number of stillbirths, suggesting that some stillbirths might have been prevented by premature induction of labour. We also feel that the 3 neonatal deaths in the labours induced at 37 weeks and the other neonatal deaths at 38 and 39 weeks might have been prevented by earlier induction of labour.

Although 37 cases were induced at 36 weeks, these must be regarded as the poorest risks since both prematurity and a high antibody titre were to be considered: only 4 of the 37 were lost, and at 37 weeks only 3 of 35 were lost. We would be the first to admit, however, that the percentage losses in the induced cases decreased as full term was more nearly approached.

The question therefore resolves itself, not into the choice between induction at 36 weeks and spontaneous delivery at term, but between controlled induction at any time in the last five weeks of pregnancy and spontaneous delivery at any time—a comparison which is hardly the same as that planned by Mollison and Walker (1952). The essence of the matter is that our cases were induced at a chosen time indicated by serological tests, as opposed to the policy of allowing the pregnancy to proceed blindly to term. Statistically the figures leave little doubt that controlled induction is preferable to the other method ($\chi^2_{(1)} = 6{\cdot}39$ $\cdot02 > p > \cdot01$), a finding which is very different from the conclusions of both the English and the American workers.

During the course of this work it was found that we were missing many of our stillbirths. The serum of a referred pregnant woman would be found to contain potent antibodies, but her records would often be filed and forgotten. Perhaps she would not appear at the hospital at any subsequent time, and it was only after we had made inquiries that it would be found that she

had been delivered elsewhere of a stillborn macerated fœtus. Had a follow-up of the mother not been done, such stillbirths would have been omitted from our records, and the ravages of hæmolytic disease of the newborn would have been unjustly minimised.

The fact that in the past, infants have been lost as stillbirths which might have been saved by more active and realistic management is unfortunate. All too often the damaging antibodies appear for the first time in the last four weeks of pregnancy. In any case, it is the last trimester of pregnancy in which the impact of hæmolytic disease of the newborn is greatest; before that time the losses are not statistically greater than in rhesus-positive women (Kelsall and Vos 1955). As is well known, the earlier the premature birth the greater is the mortality-rate of normal infants, the mortality being especially great at 35 weeks' gestation and earlier. Under modern methods of treatment the losses from prematurity alone between 36 weeks and term are few; and, if the effects of incompatibility in the erythroblastotic infant can be effectively minimised, the losses need not be unduly high. It seems that by far the greatest damage is often done in the last 4 weeks of pregnancy, when the infant might be saved.

A report will be published in due course of the follow-up of these infants when they are at least 10 months old.

Summary

We have sought to show that in hæmolytic disease of the newborn the over-all mortality-rate can be lowered by the premature induction of labour at the optimal time after 35 weeks' gestation, followed where necessary by exchange transfusion.

Of importance is the avoidance of citrated blood for exchange transfusion, a large volume (1 litre) of freshly collected warm heparinised blood being substituted.

The mortality-rate for spontaneously delivered infants (23·4%) is compared with that of infants born after premature induction (10·7%) at a time indicated by consideration of the antenatal antibody titre of the mother's serum. Statistically these figures indicate a significant preference for controlled induction.

Controlled induction of labour and subsequent treatment have virtually eliminated stillbirths after 35 weeks' gestation and have not been associated with an undue increase in neonatal deaths.

We wish to acknowledge our indebtedness to the Commissioner of Public Health for his continued interest and help in this long, and at times tedious, investigation; to Mr. R. L. Kirk and Mr. J. Shield, of the department of zoology, University of Western Australia, for their many statistical analyses and conclusions; to the matron and nursing staff of the King Edward Memorial Hospital; to those members of the laboratory staff who have so often gone out of their way to help us with innumerable tests and investigations; and finally to the Red Cross for its ever willing coöperation in providing blood.

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THE ANTI-THYROID EFFECT OF PHENYLBUTAZONE

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PHENYLBUTAZONE ('Butazolidin') inhibits the uptake of radio-iodine by the thyroid, both in man (Green et al. 1953) and in the rat (Scott et al. 1953). We record here a case in which it caused a clinically obvious goitre, and offer some observations on its mode of action.

Case-report

A woman, aged 60, had had pain and swelling of various joints since 1939. In that year she attended the physiotherapy department of University College Hospital, where a diagnosis of rheumatoid arthritis was made. In July, 1953, treatment with phenylbutazone was started in a dose of 200 mg. b.d. This was continued without interruption until she was seen by us in December, 1954. The joint pains were relieved but in September, 1954 (after 14 months' treatment), she noticed a swelling in the neck. At this time she also started to feel the cold more than formerly. Because of the last two symptoms Dr. H. A. Burt referred her to us for investigation.

When we first saw her (after 17 months' treatment with phenylbutazone) she had a firm diffuse goitre estimated to be two to three times as large as a normal thyroid. No vascular bruit was audible over it, and an X-ray film of the neck showed no distortion of the trachea. Her facial appearance was somewhat suggestive of myxœdema, but the texture of the skin was normal. The plasma-cholesterol was 330 mg. per 100 ml.

After an initial radio-iodine test (described later) phenylbutazone was stopped. A month later the goitre had disappeared.

Phenylbutazone was then restarted in the same dosage (200 mg. b.d.). A month later the goitre had reappeared and was about the same size as originally.

Phenylbutazone was again stopped, and within 2 weeks the goitre had disappeared. Phenylbutazone was then started again, because the patient's pain had increased, with the addition of sodium L-thyroxine 0·2 mg. daily, and after a month the thyroid was still impalpable. The plasma-cholesterol did not vary significantly during the period of observation.

Investigations

This patient, and several others, were given oral tracer doses of radioactive iodine, followed about an hour later by 400 mg. of potassium perchlorate orally. If an appreciable proportion of the radio-iodine in the thyroid is in the form of inorganic iodide the perchlorate will cause it to be discharged from the gland, and the thyroid counting-rate will fall (Stanbury and Wyngaarden 1952). When this happens, it provides good evidence that the organic binding of iodide by the thyroid has been prevented or slowed down. Thiouracil inhibits the binding of iodine, and hence the method can be used to show whether or not a drug has an action resembling that of thiouracil. The technique used in the present instance was the same as that used to investigate the goitrogenic action of *p*-aminosalicylate (Edwards et al. 1954).

The results obtained in the case described above are shown in fig. 1*a*. 400 mg. of potassium perchlorate was given 80 minutes after a tracer dose of radio-iodine. The thyroid counting-rate has been expressed as a percentage of the counting-rate immediately before the perchlorate was given. Curve A was obtained after the patient had had no phenylbutazone for 2 weeks. The counting-rate did not fall; therefore no appreciable quantity of iodide had accumulated within the thyroid. Curve B was obtained 2 hours after a single dose of 200 mg.

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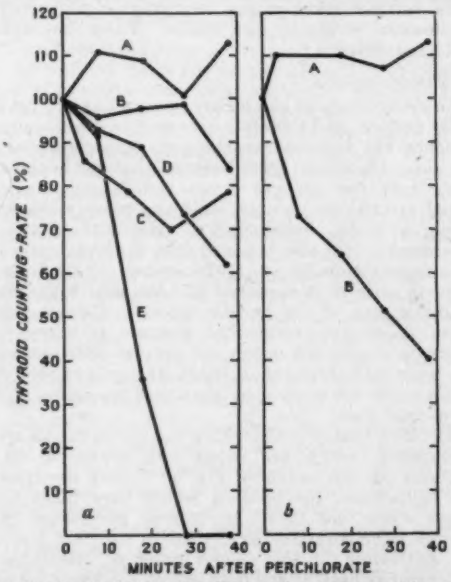


Fig. 1a—Results of administering 400 mg. of potassium perchlorate, 80 minutes after a tracer dose of radio-iodine.

The counting-rate in the thyroid has been expressed as a percentage of the figure obtained immediately before the perchlorate. A: no treatment for 2 weeks. B: after a single dose (200 mg.) of phenylbutazone. C: after phenylbutazone 200 mg. b.d. for 2 weeks. D: after phenylbutazone 200 mg. b.d. for 2 months. E: after phenylbutazone 200 mg. b.d. for 17 months.

Fig. 1b—Thyroid counting-rate in a second patient.

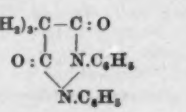
A: after phenylbutazone had been withheld for 24 hours. B: after taking phenylbutazone 200 mg. t.d.s. for 18 months.

of phenylbutazone. There was only a doubtful fall in counting-rate. Curves C and D were obtained 2 weeks and 2 months respectively after restarting phenylbutazone in a dose of 200 mg. b.d. They show a definite, but incomplete, fall in counting-rate. Curve E was obtained when the patient was first seen, after she had taken phenylbutazone continuously for 17 months. It shows an apparently complete discharge of radio-iodine from the thyroid, indicating that it was virtually all in the form of inorganic iodide.

A similar test in another patient, who had taken phenylbutazone continuously for 18 months (200 mg. t.d.s.), also showed that a considerable proportion of the thyroid's content of radio-iodine could be discharged by potassium perchlorate. After phenylbutazone had been withheld for 24 hours no discharge occurred after the administration of potassium perchlorate (fig. 1*b*). In one patient who had taken phenylbutazone 100 mg. b.d. for 3 months, and in another who had taken 200 mg. once daily for 22 months, the thyroid counting-rate did not change after the perchlorate was given. In three other subjects a single dose of 200 mg. of phenylbutazone was given 1–2 hours before the radio-iodine. Potassium perchlorate given subsequently did not affect the counting-rate.

Discussion

Phenylbutazone is 4-butyl 1 : 2 diphenyl-pyrazolidine-3 : 5 dione :



It is not related chemically to any other known anti-thyroid substance. Scott et al. (1953) described some chromatographic experiments which appeared to show that phenylbutazone could combine chemically with iodide; they suggested that this reaction might explain the drug's anti-thyroid effect. Their observations are open to the criticism that since the solvent used was water the iodide might have been partially oxidised to iodine. In our two subjects, an iodine-containing compound could be discharged from the thyroid by perchlorate; it is most improbable that any compound other than iodide would behave in this way. Therefore free iodide was present in the thyroid at the time, and it becomes difficult to postulate that phenylbutazone acts by combining with iodide. In fact this hypothesis would be tenable only if there were reason to believe that a phenylbutazone-iodide complex could be discharged from the thyroid by perchlorate; which is unlikely. It seems more probable that phenylbutazone acts like thiouracil and other known anti-thyroid agents, by either poisoning or competing with the enzyme system responsible for the oxidation of iodide.

We were unable to demonstrate any effect on iodine-binding with single doses of 200 mg.; or in two patients who had been taking less than 400 mg. daily. Green et al. (1953) used very much larger doses (1 gramme daily by intramuscular injection for 2 or 3 days) to demonstrate inhibition of radio-iodine uptake in man. Evidently the dose levels in common therapeutic use are only occasionally sufficient to affect thyroid function. In our first patient, whose dose was kept constant at 400 mg. daily, there appeared to be a relation to the length of time she had been taking the drug (see fig. 1*a*). The degree of inhibition of iodine-binding increased progressively when she had been taking it for 2 weeks, 2 months, and 17 months. This observation suggests that the level of phenylbutazone in the body tended to build up progressively, and did not affect the thyroid until a certain level had been reached. On the other hand in the second patient the block to iodine-binding disappeared after she had stopped taking the drug for only 24 hours; it may be that she was able to excrete it more rapidly.

Scott et al. (1953) found that rats were sensitive to single doses but failed to show inhibition of radio-iodine uptake after continued dosage for 10 days or more. So far there does not seem to be any evidence to suggest that the human thyroid can become resistant to phenylbutazone after long-continued treatment. Evidently there is a species difference in the response of the thyroid to this drug, or in the method by which it is eliminated from the body.

Summary

A patient developed a goitre after taking phenylbutazone for 15 months. The goitre disappeared after stopping the drug, and returned within a month after restarting. The drug was stopped a second time, and again the goitre disappeared.

Radio-iodine tests showed that in this and another patient there was a well-marked block in the synthesis of organic iodine compounds within the thyroid. No such block was found in two patients who were taking less than 400 mg. of phenylbutazone daily; and none occurred in 3 subjects given single doses of 200 mg. Observations on the original case suggested that the block became more complete the longer the patient had been taking the drug.

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EXCRETORY FUNCTION OF THE LIVER

A RE-ASSESSMENT

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MOST cases of jaundice may be correctly diagnosed by laboratory tests, especially when combined with clinical history (Higgins et al. 1944, Watson and Hoffbauer 1946, 1947, Snell 1947, Maclagan 1947, Shay and Siplet 1948, Capps et al. 1947, Popper and Steigmann 1948, and many others). In a small proportion of cases, however, the jaundice is diagnosed by laboratory methods as obstructive, yet the biliary tract is patent. This type of jaundice is known by many names, including intrahepatic primary cholestasis (Popper and Schaffner 1952), hepatocanalicular (Ducci 1947), cholangiolar (Watson and Hoffbauer 1947), and intrahepatic obstructive (Robinson and Moyer 1947, Steigmann and Popper 1943).

Classifications of jaundice are based on the accepted theory of biliary excretion, none of which is completely satisfactory. The presence of bilirubin (giving the direct van den Bergh reaction) has been accounted for in blood by postulating that bile is regurgitated back into the blood—a concept which forms the basis of more recent classifications (Rich 1930, Eppinger 1937, Ducci 1947, Popper and Schaffner 1952).

In this paper it is suggested that at least some of the major constituents of bile are secreted by the bile-duct epithelium.

The terms hæmobilirubin and cholebilirubin (Harrison 1947) will be used to denote bilirubin which gives the indirect and the direct van den Bergh reactions respectively. The two substances appear to be chemically different.

Classical Theory of Bile Secretion

Hæmoglobin is broken down in the liver and in other parts of the body by reticulo-endothelial cells and converted into hæmobilirubin (McNee 1923). Hepatic parenchymal cells change the hæmobilirubin to cholebilirubin, which is excreted into bile canaliculi, together with phosphatase, cholesterol, bile-salts, and other substances.

Evidence in favour of the classical theory is mostly indirect, and depends primarily on the presence of the biliary canalicular system, and on the presence within the canals of various substances including bile pigment.

The canalicular system has been investigated by many workers—notably Elias (1949), Chrzonszczewsky (1866), and McIndoe (1928). It is described as a system of channels with rigid walls of submicroscopical thickness which lies in grooves between adjacent faces of parenchymal cells, occasionally running near a blood-vessel. Some observers have managed to fill the canalciuli by injection from the bile-duct (Elias 1949, Eberth 1867), while others have failed (Grafflin and Bagley 1952). The canaliculi may be outlined by several methods, including parenteral injection of sodium indigo carminate (Chrzonszczewsky 1866, Elias 1949), tryptaflavine (Hirt et al. 1939), fluorescein (Grafflin and Bagley 1952) or differential staining for alkaline phosphatase (Cleveland et al. 1950).

Accumulations of bile pigment may be found in canaliculi in both obstructive and hepatocellular jaundice: similar accumulations are also seen in Kupffer cells.

Since the work of Bollman and Mann (1932) there is little doubt that hæmobilirubin is converted to cholebilirubin by the liver, although Roberts (1933) suggested on theoretical grounds that the conversion may take place elsewhere, and Robinson and Moyer (1947) believed that bile-salts may assist extrahepatic conversion. But there are several histological and experimental findings which do not readily accord with the classical theory unless further assumptions, virtually unsupported by experimental evidence, are made. These findings are considered below.

The Biliary System

The embryology of the biliary system has not yet been clearly defined, and therefore cannot give definite support to either the classical or the new hypotheses of bile secretion. Geraudel (1905) believed that the hepatic bud raises from two anlages: one endodermal, having a normal arterial circulation; and the other mesodermal, having a portal blood-supply. Hammar (1926) and Meyenburg (1918) also believed that the liver arises from two anlages, while Bloom (1926) stated: "the liver and its ducts arise from repeated dichotomous branching of the distal end of the hepatic duct." Theoretically, if Bloom is correct, congenital absence of intrahepatic bile-ducts should not occur, yet several such cases have been reported (Ahrens et al. 1951). It would appear, then, that the bile-ducts may be separated functionally from the parenchyma.

The finest biliary ducts within the portal canals are the cholangioles, which are supposedly connected to the canaliculi by the canals of Hering. They are lined by thin epithelium, the cells of which have large nuclei. Larger ducts are lined by cubical epithelium which becomes more columnar as the size of the duct increases. The epithelium of the second order of bile-ducts has mitochondria both at the base and at the free edge of the cell (Maximow and Bloom 1936), and contains fat droplets and crystals of cholesterol. The bile-ducts are surrounded by a dense network of blood-vessels.

At a conservative estimate there are twice as many bile-ducts as lobules, and in man each lobule has a diameter of about 1 mm. At least 2 m. of bile-duct are therefore present in 1 c.cm. of liver tissue; and, allowing for the presence of large vessels, an adult human liver will contain over 2 km. of bile-duct, which has a considerable surface area.

The bile canaliculi do not retain their regular pattern in all circumstances, but may become a series of disconnected vacuoles of different sizes, especially under conditions which lead to watery vacuolation of the parenchymal cells (Hirt et al. 1939, Grafflin and Bagley 1952, Trowell 1946). This does not support the hypothesis that they are rigid tubes which may withstand such procedures as maceration (MacGillavry 1865). Moreover the fact that they may be injected from the bile-duct does not prove conclusively that they are normally connected to the biliary system. It is possible to outline intracellular canals in the liver by injecting the portal vein at low pressure with coloured gelatin (Sharpey-Shafer 1920), but such canals are now thought to be artefacts. It is perhaps significant that canaliculi distended by injection under pressure do not readily collapse after the pressure is released (Elias 1949, Eberth 1867). Another system of intracellular capillaries has also been described (Williamson and Pearce 1924) but has not been generally accepted.

It is certain that some "canalicular" structure exists in the liver, but its excretory function is not proven. The structure is possibly concerned with storage, for bile pigment accumulates in it under the same conditions which produce accumulation within the Kupffer cells.

Hepatocanalicular Jaundice

Jaundice with the biochemical features of duct obstruction, but with a patent biliary system, may arise in various conditions, notably in infective hepatitis (Watson and Hoffbauer 1947) and after administration of arsphenamine (Hanger and Gutman 1940) or sulphonamides (Ducci and Echenique 1946). This type of jaundice is supposed to arise from regurgitation of formed bile into the circulation, somewhere in the region of Hering's canals or the cholangioles (Aschoff 1932, Eppinger 1937,

Watson and Hoffbauer 1947), secondarily to an increase in permeability in cholangiolar epithelium.

There does not appear to be good evidence supporting the hypothesis that cholangiolar epithelium becomes more permeable, especially since the permeability in certain cases is apparently complete enough to preclude bile arriving in the duodenum when the biliary tract is patent (Watson and Hoffbauer 1947, case 4). When bile-ducts are tied experimentally distension is common, and similar distension has been reported in man: which suggests that regurgitation does not readily take place. Moreover secretion of bile continues against pressures of 100 mm. water or more (Best and Taylor 1939)—a fact which underlines the impermeability of the biliary epithelium. Rupture of bile-ducts with parenchymal necrosis may occur in man (Popper and Schaffner 1952). Necrosis of the peripheral zone of the lobule is not described in canalicular jaundice, although regurgitation would lead to a concentration of bile in the portal tracts equal to that after obstruction.

In hepatocanalicular jaundice the parenchyma may show little change except accumulation of bile pigment, which is usually more pronounced towards the centrilobular zone. Such accumulations of pigment have been taken to be evidence of bile stasis (Popper and Schaffner 1952), but the concept of stasis does not agree with that of regurgitation nor does it explain the presence of pigment in Kupffer cells. Although the parenchyma may appear normal in hepatocanalicular jaundice there is usually some change in the portal tracts, varying from slight lymphocytic infiltration to inflammatory reaction: the pathological process presumably occurs within the portal tracts.

Ligation of the bile-ducts may produce an immediate increase of cholebilirubin in lymph from the liver (Cain et al. 1947, Gonzalez-Oddone 1946). Twenty-four hours later the lymph does not contain more cholebilirubin than does the plasma, yet the bilirubin which accumulates in plasma gives the direct van den Bergh reaction. It is difficult to reconcile the theory of increased permeability (occurring a short time after bile-duct ligation) with the lack of lymphatic cholebilirubin at a later stage when permeability should be increased and conversion of hæmobilirubin to cholebilirubin is taking place.

Abstraction of Bromsulphalein by the Liver

The fall of concentration of bromsulphalein (B.S.P.) in peripheral blood depends on several factors in addition to excretion into bile. There is some extrahepatic removal (Cohn et al. 1947, 1948) and possibly intrahepatic storage (Eberhard and Grafe 1953, Shore and Zilversmit 1954). Some reabsorption from the duodenum may occur, delaying decrease in concentration in peripheral blood (Lorber and Shay 1950).

Nevertheless it has proved possible to obtain reliable results on B.S.P. abstraction in man and to supplement these results by observations on isolated perfused livers.

The liver has been found to remove a definite proportion of the B.S.P. presented to it (Myers 1949, Cassel-man and Rappaport 1954). Thus increasing either the concentration or the rate of blood-flow will increase the amount of B.S.P. abstracted by the liver.

These observations apply only in certain circumstances. In man the blood-flow may be increased with no change or even with a concomitant fall of B.S.P. extraction, by such means as injection of adrenaline or concentrated serum-albumin (Bradley et al. 1952) and pyrogenic reactions (Bradley and Conan 1947). The total blood-flow may decrease, as on standing up after lying down, and yet the efficiency of the liver in B.S.P. removal be increased (Culbertson et al. 1951). Similar divergence between blood-flow and B.S.P. abstraction has been shown in dogs (Heinman et al. 1952).

Alteration of the circulatory dynamics of the liver therefore affects B.S.P. abstraction, and the ratio between blood-flow and abstraction is not simple. There are two apparently contradictory findings—namely, that the liver abstracts a definite proportion of the B.S.P. presented to it, and that the blood-flow may change without concomitant change in B.S.P. abstraction. The findings may be reconciled if it is assumed that the portal venous and hepatic arterial blood supply different areas of the liver, and that all areas are not equally efficient in the removal of B.S.P. from blood.

In man a far greater proportion of hepatic blood was cleared of B.S.P. after surgical formation of portocaval shunts than before (Bradley et al. 1951). In perfusion experiments on canine livers it was noted that hepatic arterial blood was cleared far more effectively than portal venous at equal rates of flow and equal degrees of oxygenation (Andrews et al., to be published).

The controlling factor in regulation of B.S.P. abstraction appears to be the artery, but the distribution of blood in the arterial bed is of great importance.

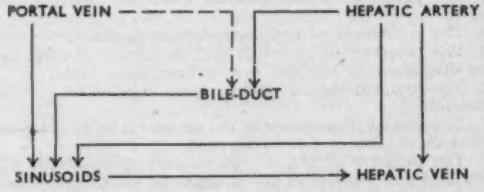
In perfused canine livers injection of adrenaline in small amounts (e.g., 1 µg. per minute) depressed profoundly the ability of the liver to extract B.S.P. from plasma, even if the flow-rate of both hepatic artery and portal vein remained unchanged. Injection of the adrenaline directly into the portal vein (instead of into the blood reservoir) had little effect on B.S.P. extraction, whereas injection into the hepatic artery inhibited extraction almost completely (Andrews et al. 1955).

There does not seem to be any interpretation of the results cited above other than that a large part of the hepatic arterial bed is concerned with the abstraction of B.S.P., whereas only a small portion of the portal venous is so concerned. Since B.S.P. and bilirubin may be excreted by the same mechanism (Canterow et al. 1948) the conclusion may well apply also to bilirubin.

Blood-supply of the Liver

The function of any organ depends basically on its blood-supply, and, as has been shown, the terminal distribution of hepatic arterial and portal venous blood appears to be related to hepatic function.

The hepatic blood-flow can be represented diagrammatically as follows (Andrews et al. 1949, Andrews and Maegraith 1951):



Wakim and Mann (1953) describe arterioportal venous connections, which I too have observed.

Wakim and Mann (1942) in transillumination studies found that at any given moment some sinusoids were supplied by mainly arterial and some by mainly portal venous blood, but this pattern has not been observed in injection studies. Anatomically the whole of the periphery of the lobule receives an arterial supply (Olds and Stafford 1930, Andrews et al. 1949). Elias (1949) described arterial vessels which supply the centre of the lobule; but many workers have not seen these vessels, and even if they carry a high proportion of arterial blood (which is unlikely) the central zone of the lobule would still receive more portal venous than arterial blood. The portal tracts are the only part of the liver which receive a predominantly arterial blood-supply, and it therefore appears probable that B.S.P. is removed from the blood supplying the bile-ducts.

New Hypothesis of Bile Secretion

I suggest that published observations on the excretory function of liver support the hypothesis that the biliary tract secretes most, if not all, of the constituents of bile. This hypothesis entails a different concept of the functions of the parenchymal and biliary cells, but not of the reticuloendothelium.

The only modification required of the accepted theory is that the parenchymal cells do not excrete the substances found in bile although they may form them. The cells convert hæmobilirubin to cholebilirubin, which is then returned to the circulation for excretion by the biliary epithelium. When failure of biliary excretion takes place pigment accumulates within the cells. Other substances which interfere with bilirubin excretion, such as B.S.P., may possibly be stored. Alkaline phosphatase is largely elaborated by parenchymal cells, for the serum concentration falls in severe parenchymal damage; some phosphatase passes from the parenchyma to the blood, and it is suggested that the plasma phosphatase is excreted by biliary epithelium.

There is insufficient evidence to determine the function of the canalicular system. No connection has been shown between the lymphatic system and parenchymal cells, yet hepatic lymph contains a high concentration of protein, some of which apparently has been newly formed (Cain et al. 1947). The canaliculi may connect the parenchyma to the lymphatics, and rupture of cholangioles, together with distension of the bile-duct, would account for filling when the bile-duct is injected under pressure.

The biliary epithelium appears to excrete the substances found in bile. As the main blood-supply to the epithelium is arterial, variations in arterial flow affect the formation of bile, and in perfused livers removal of B.S.P. is inhibited by adding 1 μg. noradrenaline per minute to the arterial flow. Biliary function would therefore appear to be analogous to renal function in that acholeresis may correspond to anuria (Maegraith et al. 1945), both being primarily due to rearrangements of the circulation.

In the profusion of disconnected observations on hepatic function are certain data which do not accord with the classical hypothesis of bile excretion, but are readily explicable by the new hypothesis. Amongst these observations are:

1. The presence of bile thrombi when the bile-ducts are patent.
2. The occurrence of hepatocanalicular jaundice.
3. The presence of cholebilirubin in hepatic lymph soon after duct ligation but not twenty-four hours later.
4. The polymorphism, under some conditions, of bile canaliculi.
5. The greater importance of the arterial than of the portal venous circulation in B.S.P. removals.
6. The presence of bile in rudimentary extrahepatic bile-ducts and gall-bladder in the absence of intrahepatic ducts (Ahrens et al. 1951).
7. The occasional great disparity between degree of jaundice and parenchymal damage (Welin 1952, Norcross et al. 1952).
8. The proliferation of bile-ducts but not parenchyma when the bile-duct is obstructed.

Three observations, however, must be mentioned as not immediately complying with the new hypothesis:

1. The bile-ducts contain but little phosphatase, as shown by histological techniques.
2. Bile-duct tumours do not contain bile.
3. In obstructive jaundice biliary cells do not contain stored bile.

None of these observations is necessarily antagonistic. Only small amounts of phosphatase need be present in cells at any given moment even during rapid excretion and we have no evidence that excretion is rapid. Storage of bile need not necessarily take place, though admittedly it would be expected. Ligated bile-ducts do not, after a time, contain bile pigment and the bile-duct tumours possibly behave in a similar fashion to ligated ducts.

Discussion

While it is admitted that the new hypothesis may prove to be wrong in several respects it does accord with known data, and it does explain simply and without further assumptions many phenomena which are imperfectly understood.

Classifications of jaundice have become more and more complex during the past twenty years; new knowledge has come to light and has been fitted, at times with strain, into the existing hypothesis. There is, for example, scant, if any, real evidence that "regurgitation jaundice" exists, and unless further experimental support is forthcoming the term should be discarded as having outlived its usefulness as a concept for pathological classification.

A simple scheme for classification of jaundice is shown below:

Prehepatic jaundice.—(*a*) Familial acholuric. (*b*) Hæmolytic.
Parenchymal jaundice.—Due to damage of parenchyma by viruses or toxic agents. There is accumulation of hæmobilirubin in the blood.
Biliary jaundice.—(*a*) Obstructive. (*b*) Due to damage to biliary epithelium (for example, by viruses). (*c*) Due to rearrangements of the circulation which divert blood from the biliary epithelium.
There is accumulation of cholebilirubin in the blood.

Mixed van den Bergh reactions are common in jaundice, especially in viral jaundice, and it appears that readjustments of the hepatic circulation may lead to retention of cholebilirubin whenever the hepatic parenchyma is damaged.

Congestion occurs in the liver after such procedures as ligation of the bile-duct or hepatic artery, injection of carbon tetrachloride, and production of infarcts (Cameron and Oakley 1932, Cameron and Mayes 1930, Tanturi et al. 1950, Cameron and Karunaratne 1936, Andrews and Maegraith 1949, Winternitz 1911). In fact it appears difficult, if not impossible, to produce damage of any part of the liver without producing circulatory changes, and these changes may lead to disturbances in biliary function. For example, simple procedures such as creation of a biliary fistula may lead to retention of B.S.P. and phosphatase (Thannhauser et al. 1937, Drill et al. 1945); retention of phosphatase also occurs in dogs after cholecystectomy (Tanturi et al. 1950).

Changes in the circulation in organs other than the liver may also lead to biliary dysfunction: Blumberg and Schloss (1947) commented on the circulatory factor in the excretion of B.S.P. and found that in cardiac failure the retention of B.S.P. was proportional to the degree of decompensation. Because of circulatory factors, therefore, some degree of cholebilirubinæmia is to be expected whenever the parenchyma is damaged or in such conditions as cardiac failure. The hepatic circulation is also changed in various conditions such as shock (Maegraith et al. 1947, Wiggers et al. 1946), and it has been suggested by many workers that the liver is of great importance in regulating the return of blood to the heart. The regulation of hepatic blood-flow appears to be extremely labile, and minor degrees of retention of B.S.P. are therefore to be expected in many clinical conditions. This is indeed the case.

It is almost axiomatic (according to the new hypothesis) that although biliary and parenchymal jaundice may exist independently, it is far more probable for biliary jaundice to exist alone than for parenchymal. Obstructive biliary jaundice seldom gives rise to difficulties of diagnosis, whilst parenchymal jaundice, having a functional element of biliary jaundice, may well do so.

Kiernan (1833) suggested that the main function of the hepatic artery was to supply the bile-ducts, and this would (on the basis of the new hypothesis) appear to be correct. Various workers (Barcroft and Shore 1912

Popper et al. 1954) suggested that the main function of the artery was to supply oxygen to the parenchyma; Markowitz (1949) took this a stage further and suggested that the primary purpose was to maintain an oxygen tension high enough to prevent development of gas-gangrene organisms. Eze (1952), however, pointed out that temporary protection with penicillin is sufficient to prolong life indefinitely, and it has not been proved that anaerobic organisms are of importance in causing death other than in the dog after hepatic-arterial ligation. From the diagram it will be seen that in complete absence of arterial supply the bile-ducts still receive a portal supply.

It has been assumed for centuries that parenchymal cells secrete bile and the assumption appears to have remained unchallenged—and unproven. The classical theory may yet be shown to be correct in several important aspects, but it will have to undergo virtual metamorphosis before it can be accepted. It may be that certain areas only of the lobule receive an arterial supply and that these areas alone secrete bile: all present evidence is, however, against this assumption. The degree of oxygenation is not the important factor, for the difference in extraction of B.S.P. persists even when artery and vein are equally well oxygenated. It appears that the classical theory of bile formation is no longer fully tenable, and the new hypothesis seems to be the most reasonable alternative.

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STUDIES ON THE ANTI-TUMOUR ACTIVITY OF *p*-DI-(2-CHLOROETHYL) AMINOPHENYLALANINE (SARCOLYSINE)

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BASED on the suggestion advanced by one of us [6] about the possible anti-tumour activity of the substituted amino-acids that can act in the body as antimetabolites, a number of derivatives of lysine [7] were synthesised some years ago. Some of them appeared to possess a low anti-tumour activity. Amino-acids as a basis for anti-tumour compounds have attracted the attention of other investigators.[3 5 12]

On the other hand, the study of chloroethylamines carried out for many years both in the U.S.S.R.[8] and abroad [9–11] showed that this group of compounds undoubtedly had therapeutic effects upon malignant diseases of the hæmopoietic system (chronic leukæmia, Hodgkin's disease) and to a slight extent upon some malignant tumours (lymphosarcoma, bronchogenic carcinoma). Accordingly it was thought desirable to obtain amino-acids with chloroethylamino groups as their substituents. It seemed reasonable to carry out this work on the basis of essential amino-acids. Derivatives of phenylalanine were selected as the first object.

In 1953 DL-*p*-di-(2-chloroethyl)aminophenylalanine (named sarcolysine) was synthesised, and in the early months of 1954 this compound was tested biologically. The very first experiments showed its great activity against certain tumours of animals, particularly against sarcomas. The findings were reported at a conference in Kiev on June 24–26, 1954.

In July, 1954, the *Journal of the Chemical Society* in London published the work of F. Bergel and J. A. Stock on the synthesis of the same compound and on its preliminary biological tests carried out by A. Haddow.[1]

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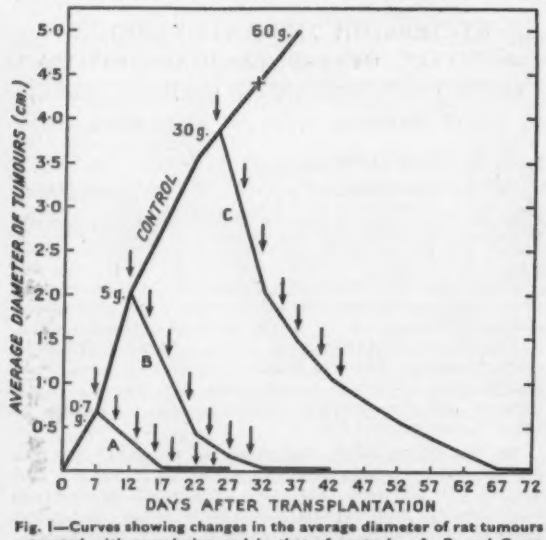

Fig. 1—Curves showing changes in the average diameter of rat tumours treated with sarcolysine and in that of controls. A, B, and C are curves of experiments with the beginning of treatment on the 7th, 12th, and 25th days after inoculation. The cross shows the beginning of deaths among untreated animals. The arrows indicate injections of the drug.

The latter found a complete inhibition of growth of Walker rat carcinoma 256.

In connection with this communication we considered it necessary to publish a short report about our findings.

Methods of Synthesis of the Compounds

The synthesis of DL-*p*-di-(2-chloroethyl)aminophenylalanine (sarcolysine) was carried out by us as follows.

Acetamido-*p*-nitrobenzylmalonic ester [2] was reduced by hydrogen in the presence of Raney nickel catalyst to acetamido-*p*-aminobenzylmalonic ester (m.p. 130–131°C; from benzene); the reaction was conducted in 95% alcohol at 50–60° for 40 minutes; yield 90%. The obtained compound was condensed in an aqueous alcoholic medium with ethylene oxide (the latter substance being taken in fivefold excess) in sealed tubes at 85–90°; acetamido-*p*-di-(2-hydroxyethyl)aminobenzylmalonic ester (m.p. 116–117° from amylacetate) was obtained with a yield of 80–90%. This compound, when interacted with thionyl chloride in a chloroform solution at 45° for 1·5 hours, gave acetamido-*p*-di-(2-chloroethyl)aminobenzylmalonic ester (m.p. 120–121°; from alcohol); yield 60%. The obtained substance was converted into DL-*p*-di-(2-chloroethyl)aminophenylalanine hydrochloride by prolonged heating under reflux with concentrated hydrochloric acid.

After reprecipitation from an alcohol-diethyl ether mixture the compound melted at 175–178° (with decomposition) in a copper block (rate 6° per minute). The compound is introduced at 100°. After recrystallisation from 95% alcohol the salt melts at 182–185°.

The free amino-acid was precipitated by means of diethylamine from an alcohol solution of its hydrochloride. After recrystallisation from aqueous alcohol it melts at 167–170° (with decomp.). The yield of amino-acid from acetamido-*p*-di-(2-chloroethyl)aminobenzylmalonic ester is 80%. For the experiments described below DL-*p*-di-(2-chloroethyl)aminophenylalanine hydrochloride dissolved in saline solution was used.

We have synthesised some analogues of sarcolysine.

DL-*p*-di-(2-bromoethyl)aminophenylalanine was obtained from acetamido-*p*-di-(2-hydroxyethyl)aminobenzylmalonic ester; the latter by interaction with thionyl bromide in chloroform solution gives acetamido-*p*-di-(2-bromoethyl)-aminobenzylmalonic ester hydrobromide (m.p. 166–168°) which when heated with concentrated hydrobromic acid and subjected to subsequent treatment with diethylamine was converted into DL-*p*-di-(2-bromoethyl)aminophenylalanine (m.p. 126–128° with decomp.).

DL-*p*-dimethylaminophenylalanine and DL-*p*-diethylaminophenylalanine are mentioned in the literature [4] but neither their method of production nor their constants have been described. These substances we obtained by the azlactone method. The azlactones (2-phenyl-4-dimethylaminobenzal-5-oxazolone with m.p. 214–215° and 2-phenyl-4-diethylaminobenzal-5-oxazolone with m.p. 123–124°) were obtained by the interaction of hippuric acid with *p*-dimethylaminobenzaldehyde and *p*-diethylaminobenzaldehyde, respectively, in the presence of acetic anhydride and sodium acetate.* DL-*p*-dimethylaminophenylalanine (m.p. 253–255° with decomp.) and DL-*p*-diethylaminophenylalanine (m.p. 194–196° with decomp.) respectively were obtained by heating these oxazolones with hydriodic acid in the presence of red phosphorus and by subsequent precipitation with ammonia.

ILLUSTRATIVE EXPERIMENT

No. of test	No. of animals	Dose in mg. per kg.	No. of injections	Interval between injections (hours)	Day on which treatment began	Average tumour weight: before treatment (g.)	Results of treatment	Body-weight (g.)	
								Before test	3 months after treatment
N9 a	10	5	5	72	7	0·5	Complete regression of tumours	110	200
b	10	5	3	72	7	0·8		122	198
c	8	15	1	—	7	0·5		119	200

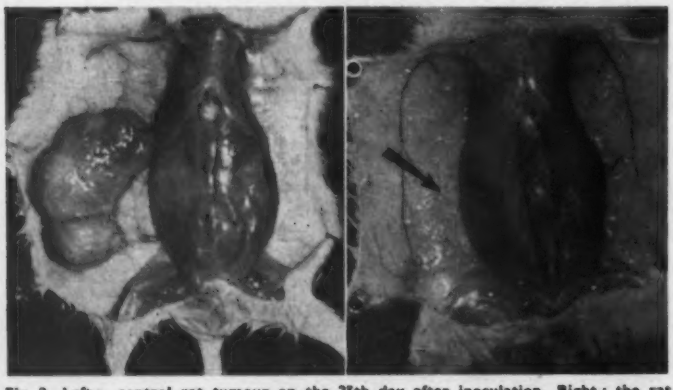

Fig. 2—Left: control rat tumour on the 25th day after inoculation. Right: the rat killed within 3 months after treatment; arrow shows the place of treated tumour.

Biological Tests

The activity of sarcolysine against the transplantable rat sarcoma 45 was studied by us in detail.

It is the strain of spindle-cell sarcoma which developed from a tumour induced by 9,10-dimethyl-1,2-benzanthracene. This strain is characterised by 100% transplantability, by rapid and rather equal growth in separate animals, and by the absence of spontaneous regression of the tumours. The animals usually die on the 30th–35th day after inoculation, the average weight of tumours reaching 60 g. and more by this time.

To characterise the sensitivity of this strain to chemotherapeutic agents we shall note that daily intraperitoneal injections of di-(2-chloro-

* These azlactones, we understand, have been prepared by F. W. Schueler and S. C. Wang (*J. Amer. chem. Soc.* 1950, **72**, 2220).—ED. L.

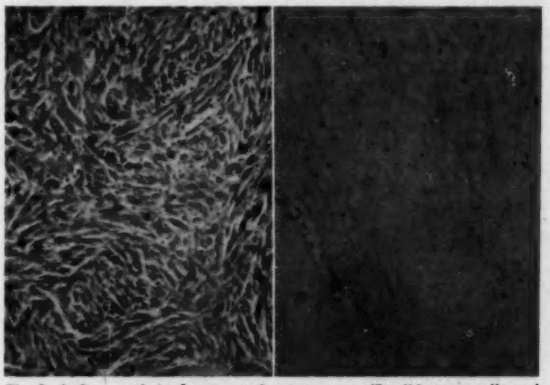

Fig. 3—Left: section of untreated rat sarcoma 45. (Hæmatoxylin and eosin. × 200.) Right: section of small nodule remained after regression of tumour treated with sarcolysine. Connective-tissue stroma of tumour is seen, but no tumour cells. (Hæmatoxylin and eosin. × 200).

ethyl)methylamine hydrochloride (designated in the U.S.S.R. as embichin) in a dose of 0·2 mg. per kg. body-weight daily exert but a very slight influence upon it even at the beginning of the treatment on the 7th day after transplantation (the average per cent. of inhibition is 16).†

On the basis of the data obtained in our laboratory (V. P. Konoplev) N,N—di-(2-chloroethyl) aniline hydrochloride administered orally in daily doses of 10 mg. per kg. body-weight gives more significant inhibition of sarcoma 45 growth (the average per cent. of inhibition is 75) but never leads to its complete regression.

The study of the activity of sarcolysine against sarcoma 45 was carried out on 240 rats. As a rule the substance was repeatedly injected intraperitoneally in the saline (up to 7 times) with intervals of 72 hours. At first we began the treatment of the animals on the 7th day after inoculation when the tumour weight reaches 0·5–1·0 g. (average—0·7 g.).

The very first tests showed that sarcolysine injected three or four times in doses of 10 mg. per kg. body-weight with intervals of 72 hours between injections rapidly leads to complete regression of tumours in all the animals (fig. 1, curve A). This was not observed with any other substances investigated by us before.

During subsequent tests the complete regression of all tumours (the dose being 10 mg. per kg. body-weight) occurred at the later commencement of the treatment—i.e., on the 12th day after inoculation, when the average tumour weight reaches 5 g. (fig. 1, curve B). Moreover, complete regression of the tumour was obtained even if treatment was started on the 25th day after inoculation—that is, only 7–10 days before the death of the untreated animals, when the average tumour weight reaches 30 g. (fig. 1, curve C; fig. 2).

However, when the drug was injected repeatedly in a dose of 10 mg. per kg. body-weight (with intervals of 72 hours), some manifestations of its toxicity were observed: the total body-weight decreased and in some experimental series a few animals died. Consequently, new experiments were carried out in which either the number of the injections decreased, or the dose was reduced to 5–3 mg. per kg. body-weight, or both, in order to find conditions in which the toxic effects of sarcolysine would be absent or insignificant.

The results of one of the experimental series are presented in the accompanying table, from which it will be seen that three injections of 5 mg. per kg. doses at intervals of 72 hours, or a single injection of a 15 mg. per kg. dose, are sufficient for the complete regression of all the tumours. In all these tests the toxic effect of the substance was not definitely observed. At the end of the experiment (on the 28th day) the average tumour weight in the control group was 40 g.

The microscopic examination of the regressing tumours revealed the disappearance of tumour cells; by the end of the treatment only a small nodule remained which contained no sarcoma cells at all, and consisted merely of the connective tissue stroma of the tumour (fig. 3). The "recovery" was stable and no relapses followed. (The follow-up was for 3 months.)

Preliminary data have been obtained on the activity of sarcolysine against some other transplantable tumours—namely, another rat spindle-cell sarcoma (strain M1) and mammary adenocarcinoma in mice (strain RSM). With these tumours under treatment with sarcolysine complete regression was not observed, but their growth was considerably inhibited (55–80%). The activity of sarcolysine against these tumours was also stronger than that of di-(2-chloroethyl)methylamine and N,N—di-(2-chloroethyl) aniline.

Together with its anti-tumour activity, sarcolysine possesses an inhibiting action on the hæmopoietic system (particularly on the bone-marrow hæmopoiesis). This activity resembles that of di-(2-chloroethyl)methylamine. But in order to obtain the same effect the doses must be about five times greater. In the doses in which sarcolysine effects the experimental rat tumours, its influence upon the hæmopoietic system of these animals does not exceed the activity of therapeutic doses of the above-mentioned compound. This enabled us to start clinical trials of sarcolysine in neoplastic diseases.

The entire study described above demonstrates the great interest presented by the research of anti-tumour compounds among chloroethylamino derivatives of essential amino-acids.

† The per cent. of inhibition was calculated according to the formula:

$$\frac{\text{Average tumour weight of control animals minus average tumour weight of treated animals, multiplied by 100 and divided by the average weight of the control animals.}}{}$$

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"... The person who presents himself to a physician does so, in the final analysis, because of anxiety. He has symptoms which he suspects are caused by something, but the cause and the remedy are beyond his capacity. This makes him anxious and forces him to seek help. Whether the chief complaint in motivating his decision is a productive cough, double vision, or pain, behind it lies anxiety. . . . In most instances this anxiety is well within the patient's tolerance and for that reason it is neither apparent nor mentioned. He merely alludes to it in an indirect way by asking to be told what to do and how to do it. In turn, the physician's prescription or the regimen he recommends indirectly treats this anxiety in that, in effect, it promises improvement if not actual cure of the complaint. These basic feelings underlie every clinician's relations with his patients. However, little if any of this is ever spelled out openly; these are the nonverbal exchanges which the skilled physician grasps intuitively."—HOWARD P. ROME, *Collected Papers of the Mayo Clinic and the Mayo Foundation*. Philadelphia and London, 1955; vol. XLVI, p. 733.

STREPTOCOCCUS PYOGENES INFECTIONS IN A HOSPITAL

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MANY surgeons and bacteriologists have the impression that, since the introduction of penicillin, cross-infection of surgical wounds with *Streptococcus pyogenes* has become rare. Evidence supporting this impression was collected at the Royal Prince Alfred Hospital, during the eleven months ended May, 1951 (Rountree 1951), when only 6 cases of probable hospital infection occurred. But in the succeeding three years to the end of June, 1954, there was an increasing incidence of streptococcal cross-infection.

TABLE I—INCIDENCE OF INFECTIONS WITH *Strep. pyogenes* IN PATIENTS FROM JULY, 1950, to JUNE, 1954

Condition	Year			
	1950–51	1951–52	1952–53	1953–54
Infected on admission :				
Pyogenic lesions	61	55	52	73
Infected in hospital :				
Surgical wounds	4	11	28	32
Bedsores	1	1	1	..
Possibly infected in hospital :				
Burns	5	4	3	3
Wounds	..	..	4	2
Histories not available ..	..	3	5	5
Total..	71	74	93	115

Incidence

The incidence was ascertained by examining the case-histories of patients from whom hæmolytic streptococci of group A had been isolated in our routine laboratory. Streptococci isolated from sputa, urine, and throat swabs were not included. An assessment was made as to whether each patient was infected before or after admission.

Table I shows the incidence of infection for the four yearly periods from July, 1950, to June, 1954. The figures for 1950–51 are those previously published (Rountree 1951) with the addition of cases occurring in June, 1951.

From 1950 to 1953 the annual number of admissions with pyogenic lesions due to *Strep. pyogenes* remained constant, but there was an increase in the number of infected surgical wounds from 4 in 1950 to 28 in 1952–53. In the following twelve months the number of infected wounds rose to 32, and there was also an increase in the number of patients admitted with infections.

Association of Streptococci with other Bacteria

In some cases the streptococci were the only pathogens isolated from lesions, but commonly other bacteria were also present. Table II shows the number of lesions containing only *Strep. pyogenes* and the number in which other organisms were also present. Infections of uncertain origin have been omitted from the table; "the infected in hospital" cases include the 3 bedsores.

Of the 180 patients infected on admission 70 (38·9%) had *Strep. pyogenes* alone; of the remainder 96 (53·3%) had also *Staphylococcus aureus* in their lesions. Approximately half (51 out of 96) of these staphylococci were penicillin-resistant. A small number of lesions yielded *Escherichia coli*, *Pseudomonas pyocyanea*, or proteus, mixed infections with one of these bacteria and *Staph. aureus* occurring occasionally.

Of the 73 patients infected in hospital, 21 (28·8%) had streptococci alone, while 46 (63·0%) had *Staph. aureus* as well. The majority (82·6%) of these staphylococci were penicillin-resistant, and many were also resistant to streptomycin, oxytetracycline, and aureomycin. It has already been shown (Rountree and Thomson 1952) that, in 1952, 64·7% of the strains of *Staph. aureus* isolated from inpatients in this hospital were penicillin-resistant; and unpublished observations in the succeeding years indicate that this incidence has been maintained. The association of these antibiotic-resistant staphylococci with *Strep. pyogenes* infections acquired in hospital is not therefore surprising.

Sources of Cross-infecting Streptococci

The association of many infections with the hospital strains of *Staph. aureus* suggests that their source was the flora of the respiratory tract of the hospital personnel or the infected wounds of other patients in the same ward. Throat swabs for *Strep. pyogenes* are taken from the nursing staff on various routine occasions, and also if they are suffering from sore throats or tonsillitis. An increased incidence of streptococcal throat infection in the nursing staff which might constitute a source of wound infection should therefore be apparent in the routine laboratory records.

TABLE III—QUARTERLY INCIDENCE OF *Strep. pyogenes* IN PATIENTS' LESIONS AND IN THROAT SWABS FROM NURSING STAFF, INPATIENTS ON ADMISSION, AND CASUALTY PATIENTS

Period	No. of patients infected		Positive throat swabs (%)		
	On admission	In hospital	Staff	In-patients	Casualty patients
July–Sept., 1951 ..	16	2	8·8	5·3	11·7
Oct.–Dec., 1951 ..	15	3	8·3	7·7	11·1
Jan.–March, 1952..	13	1	9·0	3·3	16·4
April–June, 1952..	11	5	13·2	9·0	25·0
July–Sept., 1952 ..	18	7	6·3	5·1	19·3
Oct.–Dec., 1952 ..	7	7	10·4	11·0	34·2
Jan.–March, 1953..	14	8	5·8	13·7	9·0
April–June, 1953..	13	10	5·0	1·5	7·1
July–Sept., 1953 ..	21	15	22·2	8·8	19·7
Oct.–Dec., 1953 ..	25	6	14·8		22·5
Jan.–March, 1954..	16	7	12·7	6·4	13·5
April–June, 1954..	11	6	11·8		17·3

Routine throat swabs are also taken from children on admission and from adult patients admitted to the clinical research ward. The incidence of hæmolytic streptococci in these swabs should reflect the carrier-rate in the general community. Throat swabs are taken from casualty patients presenting themselves with sore throats

TABLE II—ASSOCIATION OF OTHER BACTERIA WITH *Strep. pyogenes* IN PYOGENIC LESIONS

Where infected	Year	Total no.	*Strep. pyogenes* alone	Plus *Staph. aureus*		Plus *Esch. coli*	Plus *Ps. pyocyanea*	Plus proteus
				Penicillin-sensitive	Penicillin-resistant			
On admission	1951–52	55	18	14	23	4	1	..
	1952–53	52	17	18	10	4	3	1
	1953–54	73	35	13	18	7	2	2
Total		180	70 (38·9%)	45 (25%)	51 (28·3%)	15 (8·3%)	6	3
In hospital	1951–52	12	5	..	6	..	1	..
	1952–53	29	4	3	19	..	4	1
	1953–54	32	12	5	13	1	..	..
Total		73	21 (28·8%)	8 (11%)	38 (52%)	1	5	1

or tonsillitis, and the incidence of streptococci in these swabs should give an index of the amount of clinical streptococcal infection in the community.

The percentages of positive throat swabs obtained from these three groups of people in quarterly periods from July, 1951, to June, 1954, are given in table III, together with the incidence of streptococcal wound infection and of infections on admission during the same periods.

Compared with the nine months from July, 1951, to March, 1952, there was an increased incidence of hæmolytic streptococci in the throats of staff during the periods April–June, 1952, October–December, 1952, July–September, 1953, and October–December, 1953. The first period of increased incidence in the staff corresponds to the occurrence of 5 cross-infected wounds.

The highest incidence in wounds—namely, 15 cases in July–September, 1953—also corresponds to the period when there was the highest incidence in the staff. In not all the quarters do the figures agree so well; for example, in the second quarter of 1953 there were 10 cases of wound infection while the incidence of positive throat swabs in the staff was only 5%. However, 5 of these 10 cases occurred in one particular ward, and in some of these cases there was evidence of spread from patient to patient.

There was an increased incidence of hæmolytic streptococcal throat infections in casualty patients throughout 1952. The incidence declined during the first six months of 1953 but was again high from July, 1953, onwards. The main peaks of incidence in the casualty patients correspond to those in the nursing staff, and both are evidently related to outbreaks of streptococcal sore throats and tonsillitis. No correlation can be seen between the incidence in casualty and in patients admitted with pyogenic lesions. Similarly there seems to be little correlation between the incidence of streptococcal throat carriers among patients on admission and the incidence in casualty patients. Taken as a whole, the figures in table III suggest that the increased incidence of streptococcal wound infection could be associated with an increase in the number of nurses suffering from streptococcal throat infection. Similarly the periods of highest incidence of positive throat swabs in the staff correspond to peaks in the casualty patients, suggesting that outbreaks of clinical streptococcal tonsillitis and sore throats occurred at these times.

Discussion

In recent years attention has been focused on antibiotic-resistant staphylococci as the chief cause of wound infection in hospitals, and it seems to have been assumed that control of the hæmolytic streptococcus no longer presents any problem. A search of published work reveals no recent reports of streptococcal infection of surgical wounds. However, Gibson and Calman (1953) described a sharp outbreak of puerperal infection at Queen Charlotte's Hospital, London. This began in November, 1952, and 25 cases had occurred by February, 1953. *The Lancet* (1953) remarked that this outbreak was a reminder that "the hæmolytic streptococcus has not lost its sting."

Our experience in Sydney shows that, while in 1950–53 there was no increase in the numbers of patients admitted to hospital with pyogenic lesions caused by streptococci, there was a steady increase in the numbers acquiring wound infections while in hospital. Many of these infections were associated with penicillin-resistant staphylococci and were in patients whose operations had been carried out under a penicillin cover. Experience at the Medical Research Council Burns Unit at Birmingham (Jackson et al. 1951) has shown that prophylactic penicillin cream is valuable in preventing colonisation of burns with *Strep. pyogenes*. When, however, the streptococcus is implanted into a surgical wound along with an antibiotic-resistant staphylococcus that is a potent penicillinase producer, it would seem that parenteral penicillin cannot be relied on to prevent streptococcal colonisation of the wound. All our strains of *Strep. pyogenes* have been penicillin-sensitive.

No patient in this series had a generalised streptococcal illness consequent to his wound infection. Nevertheless, the results of this investigation suggest that complacency regarding the hæmolytic streptococcus is inadvisable.

Summary

During the four years from July, 1950, to June, 1954, there was an increasing incidence of hæmolytic streptococcal infection of surgical wounds in a hospital in Sydney. Many of these infections were associated with penicillinase-producing staphylococci.

The increased incidence of wound infection was partly correlated with an increased number of streptococcal throat infections in the staff.

This work was supported in part by the Australian National Health and Medical Research Council. I am indebted to members of the honorary staff for permission to use their case-records, and to Miss C. Spurway and the staff of the medical records department for their assistance with the case-histories. An inquiry from Dr. Leonard Colebrook, F.R.S., prompted this investigation.

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CHLORPROMAZINE AS AN AID TO COOLING IN A THYROID CRISIS

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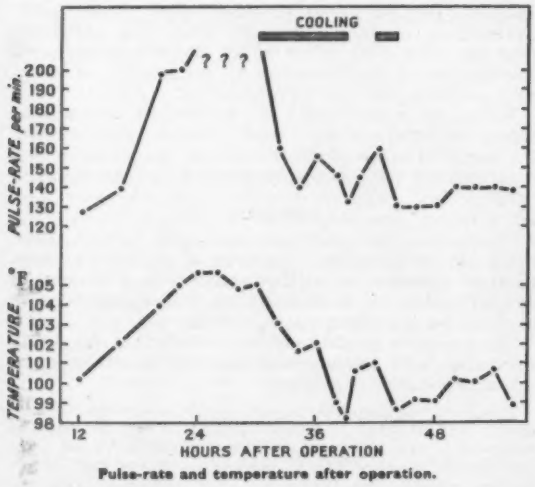
CRISES after operation for exophthalmic goitre are now rare. Pre-treatment with thiouracil and the pre-operative administration of iodine have reduced the risks of surgery in this condition to vanishing-point. There is still, however, no really reliable method of assessing the severity of the metabolic disturbance produced by hyperthyroidism. There are numerous fallacies in determinations of the basal metabolic rate, especially in apprehensive patients; and even the use of radioactive iodine, when it is available, does not always give conclusive results. Thus the differential diagnosis of anxiety neurosis from hyperthyroidism is still sometimes difficult; and occasionally a patient with true hyperthyroidism slips through and reaches the operating-table, with the double diagnosis of thyrotoxicosis and anxiety state, not as fully prepared as is desirable. The following case indicates what may happen.

Case-record

A married woman, aged 37, was admitted to hospital on March 21, 1955, complaining of "nerves," tremor, and loss of weight. She had slight exophthalmos, a diffuse soft enlargement of the thyroid gland, and tachycardia. After treatment for three weeks with phenobarbitone and Lungol's iodine, her sleeping pulse-rate had fallen to 80 per minute, although her waking pulse was extremely unstable. It was, however, felt that this was due more to an anxiety state than to hyperthyroidism, and operation was undertaken.

Operation.—The patient was premedicated with 'Omnopon' gr. $^1/_3$ and scopolamine gr. $^1/_{200}$. Anæsthesia was induced with 0·25 g. thiopentone and maintained with nitrous oxide and oxygen. During operation a further 0·3 g. of thiopentone was administered together with 75 mg. pethidine; 30 mg. suxamethonium was given to facilitate intubation, and the trachea was anæsthetised by spraying with 3 ml. of 2% amethocaine delivered from a Macintosh spray. The patient's pulse-rate



Pulse-rate and temperature after operation.

shortly after induction was 114, and it rose steadily during operation until fifty minutes later it was 140. It remained at about this level for the remainder of the operation, which was a subtotal thyroidectomy and lasted seventy minutes. On return to bed the pulse-rate was 120 per minute, respiratory rate 24 per minute, and temperature 100·2°F.

Progress.—During the succeeding day the temperature rose steadily to 105°F, and the pulse-rate to 200; and thereafter the pulse became completely uncountable, and auricular fibrillation developed. Despite treatment with digoxin and intravenous iodine and sedation with phenobarbitone, the patient's condition deteriorated steadily until, some thirty hours after operation, her respiration was rapid (rate 42 per minute) and gasping, her pulse was completely uncountable, and she was semiconscious though she would speak when roused; her heart sounds had become more or less equal in quality, and it was felt that she was unlikely to survive for longer than twelve hours.

When, twenty-four hours after operation, it had become apparent that a thyroid crisis was developing the patient was given by mouth a test dose of chlorpromazine 25 mg., followed by 50 mg. four hours later. A further 50 mg. was given every eight hours during the subsequent seventy-two hours. The blankets were at once removed from the bed. When, thirty hours after operation, her condition had deteriorated despite gentle cooling, 100 mg. of pethidine was cautiously injected intravenously over ten minutes. The patient was packed round with ice-bags in her axillæ and groins and on her abdomen, and placed in an oxygen tent. The nursing staff were instructed to take the mouth-temperature half-hourly, and to remove the ice if this fell below 98°F. Two hours after the initial application of ice the patient became restless, presumably because of discomfort; an additional 50 mg. of pethidine was given intramuscularly, and this dose was repeated four-hourly for the next forty-eight hours.

Her temperature fell steadily after the application of ice, and next morning her pulse-rate was 136, respiratory rate 20, and temperature 98°F. The ice-bags were removed. Five hours later, when the temperature had again reached 101°F and the pulse-rate 160, they were reapplied for a further two hours, after which her temperature again fell to 98·6°F. Subsequently her condition improved steadily; but administration of pethidine and chlorpromazine was continued so that cooling could be begun again without difficulty should the need arise. Her pulse-rate became regular some twelve hours after the application of ice, and her condition improved further over the subsequent three days. Her convalescence was uneventful, and she was discharged from hospital well on the fifteenth postoperative day.

Discussion

The essential problem in thyroid crises is to reduce the excessive metabolic rate. In the past there has been no completely effective method of doing this, and the condition has carried a very considerable mortality. Dundee et al. (1953) showed that cooling, combined with the administration of chlorpromazine to prevent shivering, effectively reduced the normal metabolic rate to subnormal levels. Gray (1955) has suggested that this method should be used to reduce abnormally high metabolic rates, but I am not aware that hitherto it has been applied for this purpose.

In the present case the combination of cooling with prevention of shivering by administration of chlorpromazine and pethidine seemed to be responsible for the patient's recovery. It is, of course, impossible to be certain of this; but the steady fall in temperature and reduction in pulse-rate which twice followed cooling at least indicate that the method is worth trying in patients with this most grave complication. Further, this method does not involve the heavy demands on the staff involved in full-scale "artificial hibernation"; and it can be applied where there are facilities only for the routine surgical nursing care of patients.

Summary

In a hyperthyroid patient subtotal thyroidectomy was followed by acute hyperthyroidism, and survival seemed unlikely. Recovery followed cooling facilitated by the administration of chlorpromazine and pethidine.

I am indebted to the junior medical and surgical staff of Stepping Hill Hospital, Stockport, for their help in treating this patient, and to Mr. N. W. Bolton for permission to publish this account of the case.

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ARGENTAFFINOMA (CARCINOID TUMOUR) WITH CYANOSIS

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THE interesting syndrome of argentaffinoma with liver metastases and associated cyanosis, pulmonary stenosis, and diarrhœa was first described in 1952 and has had several references recently. As the condition is still a rare one and not fully understood, the clinical details of a further typical case are perhaps worth recording.

Case-record

A bank manager, aged 61, was first seen on Dec. 23, 1952. His previous health had been normal except since the 1914–18 war he had had unexplained attacks of diarrhœa. Five years prior to 1952 he had had a full investigation with barium meal, barium enema, sigmoidoscopy, and laboratory examination of the fæces, all with negative results. No treatment was recommended.

Since 1918 he had always had 2 motions per day, but with worry he might have to go 5 times. He was referred for special examination in 1952 because occasional blood was seen in the stools and for the first time he was having pain. He had a good colour and his weight was normal. His motions were occasionally, he said, like tomato sauce, and the pain was localised in the right iliac fossa and the right groin.

There was a mass the size of a closed fist in the cæcal area, and a provisional diagnosis of carcinoma—with the alternatives of hypertrophic tuberculosis or Crohn's disease—was made. Barium meal and enema confirmed an irregular filling defect in the region of the ileo-cæcal valve.

At *operation on Jan. 15, 1953*, a hard mass was found involving the cæcal wall and the ileo-cæcal valve, with some dilatation of the terminal ileum. There were a few glands in the ileo-cæcal angle, and in the liver about a dozen secondary deposits—none larger than a small marble. The naked-eye diagnosis was adenocarcinoma. A right hemicolectomy was performed.

The *histological report* (Prof. J. H. Biggart) was: "In the region of the ileo-cæcal valve the mucosa shows several sessile nodules about 4 to 8 mm. in size. Histologically these nodules present the structures of a carcinoid tumour which is spreading deeply through the muscle coat. In general these tumours do not metastasise but in this instance there is rather more hyperplasia of the tumour cells and less uniformity in the structure than usual, so that the prognosis is uncertain.

May 26.—He was very well, with no trouble except diarrhœa. An exceptionally high colour was noted.

Feb. 22, 1954.—The high colour had changed somewhat from bright red to a slightly purplish colour. Weight, 9 st. 7 lb. No change. He was eating poorly. His bowels were now moving 7 times a day and he was almost afraid to go out of the house. Diarrhœa was considerably worse, and more constant, but unfortunately with a history of diarrhœa since 1918, and a large functional element, part of this was discounted.

March 10, 1954.—His condition had so much deteriorated that a further laparotomy was carried out. The entire gut was normal, and the anastomosis satisfactory. The liver secondaries had enlarged in size and increased in number, but not greatly, perhaps 50% in all, as compared with the findings at the operation fourteen months previously. There was considerable œdema of the legs and scrotum and difficulty in bending the legs. The hands were cold and blue. His colour was now a deep plum colour. He kept his head high for breathing but had no difficulty with inspiration. He had a poor appetite and difficulty in swallowing.

July 8, 1954.—He was finally readmitted—moribund—on account of diarrhœa, weakness, œdema of the legs, and frequency of micturition. Ascites was now present. His tongue was moist and coated. His temperature was normal. Pulse was 80–120 per min., erythrocyte-sedimentation rate 12 mm. in one hour, packed-cell volume 50%, plasma specific gravity 1027. Treatment was symptomatic, and the patient died on July 19.

Discussion

Unfortunately throughout it was not recognised that this was a case of Biörck-Thorson syndrome. It is now many years since it was originally suggested that the carcinoid was possibly a hormone-producing tumour, but only in the past two or three years has the syndrome been recognised in its various complexities, by the piecing together of apparently unrelated symptoms.

Although the syndrome of metastasing carcinoid with pulmonary stenosis and cyanosis is looked on as the main features of the syndrome, I would suggest that diarrhœa be added, for it is known that serotonin has a strong peristaltic action and in this case, as in others, diarrhœa was an outstanding symptom and yet at operation the entire alimentary canal failed to show any irritative lesion.

Page et al. (1955) have lately discussed the next step in the diagnosis.

The syndrome is caused by the release of serotonin (5-hydroxytryptamine) produced by the tumour or its metastases. They were able to prove their thesis by discovering a raised level of serotonin in the blood and by the presence in the urine of excess of 5-hydroxy-indole-acetic acid (5 H.I.A.A.), which is the terminal stage in the breakdown of serotonin as excreted in the urine.

Selected test patients were given intravenous injections of serotonin and the urinary output level was found to give the proportion of the serotonin which was excreted as 5 H.I.A.A.

In 3 cases of malignant carcinoid the daily urinary output of 5 H.I.A.A. was found to be 65, 350, 142 mg. instead of the normal 5–10 mg. per 24 hours.

It is possible in time that the urinary output of 5 H.I.A.A. will be as valuable a laboratory test for the malignant carcinoid as the acid phosphatase estimation is for the malignant prostate, or adrenaline for phæochromocytoma, or gonadotropin for chorionepithelioma.

What the connection is between the syndrome and the raised serotonin level is not yet clear, for in these patients who have had the level of serotonin raised artificially, the syndrome did not appear. Moreover, even in some cases with typical carcinoid with liver metastases, the other features of the syndrome are not necessarily present.

Summary

A case of malignant carcinoid with liver metastases and the features of pulmonary stenosis, cyanosis, diarrhœa, and œdema adds another example to the small number of instances of Biörck-Thorson syndrome already published.

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IRRADIATION NEPHRITIS

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IRRADIATION nephritis is a grave and insufficiently recognised complication of radiotherapy. Published necropsy reports are so few that it may be instructive to record the following case.

Case-record

A 3-year-old boy was admitted to the Royal Aberdeen Hospital for Sick Children on July 6, 1954, with left-sided abdominal pain and vomiting which had persisted for two days. He was thin and pale and had a large, hard, smooth mass in the left kidney region. The urine was normal. Blood examination revealed a normochromic anæmia (hæmoglobin 10·9 g. per 100 ml.), leucocytosis (17,400 per c.mm., with 88% neutrophils), and normal platelets. X-ray examination showed a left-sided soft-tissue mass extending from the 11th thoracic vertebra to the iliac crest. On intravenous pyelography no dye was secreted by the left kidney, which at laparotomy on July 9 was found to be largely replaced by a neoplasm. Nephrectomy proved difficult and there was uncertainty regarding the completeness of extirpation of tumour tissue. Histologically, the neoplasm was a nephroblastoma (Wilms tumour). In the unaffected part of kidney the glomeruli were normal.

Radiotherapy was started on July 14, using initially an anterior field only; for eight days the daily incident dose was 100r. On July 26 treatment was changed to anterior and posterior 15 × 20 cm. fields, the daily dose to each field increasing gradually from 50r to 100r over four weeks. The latter dosage was continued until Sept. 15, making a total incident dose of 3300r over 46 days. The X-ray machine was a Westinghouse deep X-ray model working at 230 kV. and

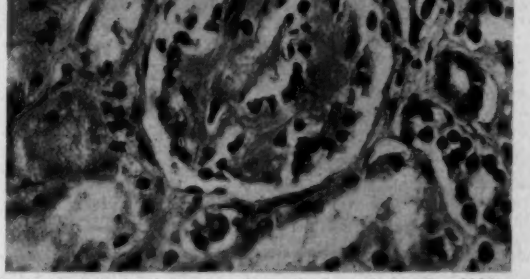

Fig. 1—Hyalinised and shrunken glomerulus from the irradiated kidney. (H. & E., × 320.)

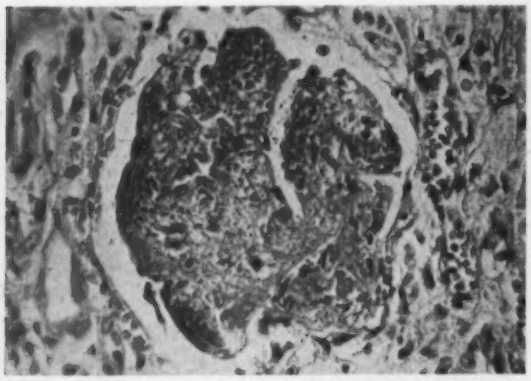

Fig. 2—Hyalinised but swollen glomerulus from irradiated kidney. Some of the glomerular loops are engorged with blood, probably due to stasis. (H. & E., × 320.)

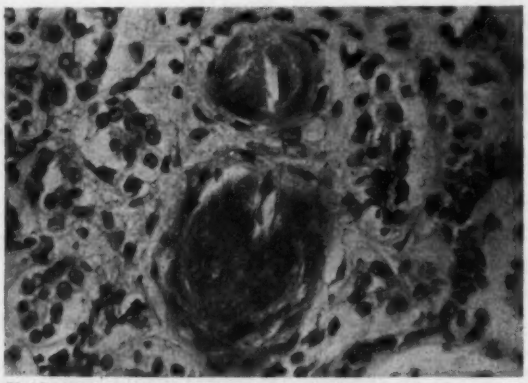

Fig. 3—Marked fibrinoid change in an afferent arteriole, sectioned in two planes. (H. & E., × 320.)

15 mA., with a single Thoraeus filter to give a half-value layer of 2·5 mm. copper.

The patient returned home on Sept. 18 and looked well one month later. On Nov. 4 almost four months from the start of radiotherapy, he was readmitted because he had had œdema of face and hands for 2 days. The urine was said to be dark and small in volume. There was no history of infection. On examination, the face, hands, and feet were moderately œdematous, the blood-pressure was 130/95 mm. Hg, and the liver was enlarged two inches below the right costal margin. The urine contained much albumin and small numbers of erythrocytes, with hyaline and granular casts. The blood-urea was 61 mg. per 100 ml. and hæmoglobin 5·9 g. per 100 ml. Leucocytes and platelets were normal.

Despite a low-protein intake with fluid restriction, œdema persisted and vomiting became frequent. On Nov. 14 the blood-urea was 147 mg. per 100 ml., pulmonary congestion and gallop rhythm were present, neck veins were distended, and the liver was considerably enlarged and tender. Digitaline, penicillin, and a very slow blood-transfusion (640 ml.) produced only temporary improvement and he died on Nov. 20. Bloody diarrhœa and hæmatemesis occurred shortly before death.

Necropsy Findings

Necropsy was performed 39 hours after death. Body-length was 1·02 m. (3 ft. 4 in.) and body-weight 13·7 kg. (30 lb.). There was marked cutaneous pallor and slight pitting œdema of extremities. Small serous effusions were present in peritoneal, pleural, and pericardial sacs. In the lungs there were a few small, scattered metastases, partial collapse, œdema with intra-alveolar hyaline "membranes," and slight bronchopneumonia. No tumour tissue was found elsewhere. The heart showed myocardial pallor, dilatation of all chambers, and ante-mortem thrombus in the auricle of the right atrium. The brain (1400 g.) was œdematous and there was chronic venous congestion of the liver (500 g.). Hæmorrhagic erosions were seen in the gastric mucosa. There was lymphoid atrophy in upper abdominal lymph-nodes and spleen (40 g.). Pancreatic islets showed slight hyalinosis.

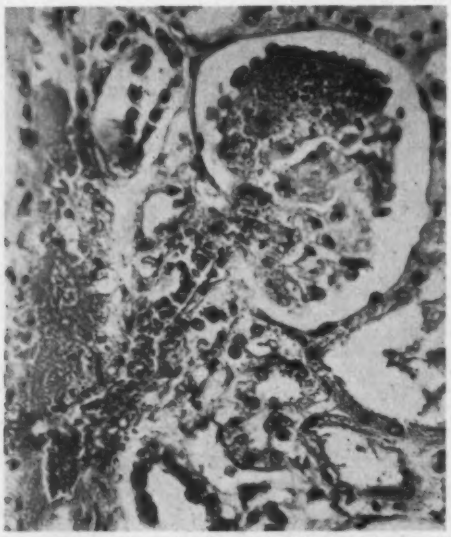

Fig. 4—Irradiated kidney showing fibrinoid change in intralobular artery; wall of afferent arteriole normal but lumen filled with red blood corpuscles probably due to stasis. Glomerular changes same as in fig. 2. (H. & E., × 320.)

The right kidney (70 g.) was normal in size and shape. Its thin capsule was easily stripped from the outer surface which was smooth. The parenchyma was of normal pattern but pale and firm. Paraffin sections of formalin-fixed blocks were stained routinely with hæmatoxylin and eosin; additional sections, including serial ones, were stained with Masson's trichrome stain, Mallory's phosphotungstic acid-hæmatoxylin, and by the periodic-acid-Schiff method. Most glomeruli were damaged, the most notable feature being a weakly eosinophilic hyaline change, with obstruction or obliteration of capillary loops. In some of these glomeruli unaffected loops were much congested with blood and sometimes presented also a deeply eosinophilic, "fibrinoid" appearance—features like those described in renal cortical necrosis (Shaw Dunn and Montgomery 1941). Many glomeruli were normal in size; others were enlarged or shrunken; many were slightly fibrosed but capsular adhesion was rare. Except in the collecting part, the tubular epithelium was degenerate or atrophic. Hyaline or granular casts, and sometimes a few erythrocytes, were seen in a few tubules. Some afferent arterioles and occasional intralobular arteries had undergone fibrinoid change, often with considerable narrowing of the lumen. This change did not always co-exist with glomerular change and vice versa. There was mild interstitial fibrosis but no leucocytosis. Some of the microscopic features are illustrated in figs. 1 to 4.

Discussion

In the past, renal damage following radiotherapy has been dismissed as an unlikely possibility. The kidneys were regarded as relatively radio-resistant. Hartman et al. (1926), however, demonstrated that the syndromes of acute and chronic nephritis could occur in dogs after irradiation of their kidneys. Incidentally, this simple bloodless technique might prove a satisfactory method of producing hypertension in experimental animals.

Dean and Abels (1944) described the occurrence of persistent hypertension in a 20-year-old girl seven years after radiotherapy for alleged abdominal Hodgkin's disease. Hypertension subsided after removal of the left kidney, the lower pole of which was markedly sclerosed.

Zuelzer et al. (1950) in America described "unusual acute glomerulonephritis" following irradiation in three children, two of whom had had nephrectomy for nephroblastoma while the third had a retroperitoneal neuro-

blastoma. All developed symptoms of acute nephritis within six months of the start of radiotherapy and died of renal failure within four weeks. The total incident dosage was relatively high: 5200r to 6850r in four months.

In a notable publication, Luxton (1953) described serious and alarming renal damage in 27 adults irradiated for seminoma at the Christie Hospital and Holt Radium Institute, Manchester. 13 patients developed features of acute nephritis six to twelve months from the start of irradiation and 5 died within a few months, while the others developed chronic nephritis. Autopsy showed kidney changes similar to those in our own case and to those described by Zuelzer et al. (1950) in children and by Hartman et al. (1926) in dogs. Death was attributable to renal damage and in no case was there tumour metastasis. The total central dosage varied from 2900r to 3250r over an average of thirty-six days. Notable clinical features in the 13 acute cases were severe albuminuria, hypertension, refractory normochromic anæmia, and raised blood-urea concentration. 12 other patients developed features of chronic nephritis and the remaining 2 presented with fulminating malignant hypertension.

Summary

Following abdominal irradiation for nephroblastoma, a child of 3 had fatal renal damage. Attention is drawn to the possibility of this serious complication of radiotherapy and the necessity for careful regulation of dosage. In experimental pathology, it is suggested that irradiation of the kidneys might prove a useful method of producing hypertension in animals.

We are indebted to Prof. John Craig and to Mr. S. G. Davidson for allowing us to publish clinical details, to Dr. E. F. Ridley for considerable assistance with radiotherapeutic data, to Prof. J. S. Young for valuable suggestions, and to Mr. R. Drummond for the photographs.

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Medical Societies

HEBERDEN SOCIETY

A CLINICAL meeting of the Heberden Society was held at the Sheffield Centre for the Investigation and Treatment of Rheumatic Diseases on July 1 and 2, under the presidency of Prof. R. E. TUNBRIDGE.

Reablement of Arthritic Patients

Dr. G. R. NEWNS (Sheffield) reviewed changes in functional status of 238 patients with rheumatoid arthritis, first seen during a period of twelve months, with particular attention to the results of treatment in 28 patients who required correction of deformity in weight-bearing joints. In 73% of such cases some improvement was maintained three to four years later.

In the discussion the importance of supervising the continuation of treatment by active exercises in the home was considered, and the expense of employing trained physiotherapists for this purpose was noted.

Mucoproteins

Dr. E. LOCKEY and Dr. A. J. ANDERSON (London) discussed the results of estimating urine and serum mucoproteins in rheumatic diseases. In rheumatoid arthritis the level of serum-mucoprotein was usually higher than normal; the level was about the same as in other types of inflammatory disease, but below that in cancer. There was no obvious difference between the results in rheumatoid arthritis and ankylosing spondylitis. Information about urine-mucoprotein levels was scanty, but some correlation with serum levels was found. There was a very rough correlation between serum-mucoprotein values and the erythrocyte-sedimentation rate; and a definite one, absent in other diseases, between serum-mucoprotein values and the results of flocculation tests. Evidence was presented that mucoprotein is not responsible for the agglutination phenomenon which forms the basis of the Waaler-Rose test.

In the discussion, speakers emphasised the difficulty of correlating abnormalities which are themselves not specific for a single disease.

Rheumatoid Arthritis in Psychotics

Dr. T. L. PILKINGTON (Sheffield) described preliminary findings indicating a low incidence (less than 0·7%) of rheumatoid arthritis in schizophrenia—contrasting with a normal incidence in mental deficiency and in epilepsy.

In the discussion it was suggested that a study of this sort might usefully include a comprehensive radiographic survey, and that prolonged inactivity might contribute to the low incidence in schizophrenics.

Meticorten

Dr. H. F. WEST (Sheffield) described his recent experiences with a new synthetic steroid 'Meticorten.' In 3 cases changed from hydrocortisone (systemic) or corticotrophin to meticorten, a reduction in blood-pressure and a loss of retained water was observed; but in 2 of the patients severe epigastric pain developed.

In the discussion a fourfold enhancement of anti-inflammatory activity by meticorten, compared with cortisone, was described. An unexpectedly favourable response in a case of rheumatoid arthritis with advanced amyloid nephrosis was mentioned, and the reduction in blood-pressure and œdema on changing from cortisone to meticorten was confirmed.

Lumbar Vertebræ

Prof. D. H. COLLINS (Sheffield) described the pathological conditions revealed by routine examination of the lumbar vertebræ in 100 consecutive, unselected necropsies. Metastatic carcinomatous deposits were found in 11 cases, osteoporosis in 9, Paget's disease in 3, leukæmic deposits in 2, and myeloma in 1. The frequency of osteoporosis rose from 7% in the seventh decade to 21% in the eighth, and 63% in the ninth.

Adverse Effects of Cortisone

Dr. WEST surveyed the fatalities and adverse reactions in 52 cases of rheumatoid arthritis treated with cortisone for one to five years. Of 6 patients who died during treatment, amyloid disease was found in 2 and polyarteritis nodosa in a 3rd. Since both these conditions can occur in association with rheumatoid arthritis, their relation to cortisone therapy is difficult to appraise. 1 patient was found at necropsy to have had severe myocardial fibrosis, and 2 others died (1 suddenly) of pneumonia. The non-fatal adverse reactions included psychotic disturbances in 3 cases. Injections of corticotrophin occasionally produced anaphylaxis.

In the discussion Dr. OSWALD SAVAGE commented on 6 fatalities among 90 patients treated for long periods with cortisone.

Gout

Dr. R. SOUGIN-MIBASHAN said that in South Africa gout occurs with about the same frequency in the White and Coloured populations of Cape Town, but is almost unknown in Negroes. 50 cases were treated with probenecid: untoward reactions were confined to occasional slight epigastric discomfort in 4. The clinical effects included disappearance of pain and stiffness (after four to eight weeks), reduction in the size of tophi and a return of movement in fixed big-toe joints (after six to nine months), and sometimes radiographic improvement. Colchicine was given during the early stages of treatment with probenecid, to prevent the acute attacks which tend to occur at this time.

Occupational Factors in Joint Disease

Dr. J. S. LAWRENCE, of the Walkden Miners' Clinic, discussed the results of a survey of occupational factors in degenerative joint disease. Miners and dock-workers had a high incidence of disc degeneration in the lower dorsal and lumbar spine, and also of osteo-arthritis in the knees. Degenerative changes in the cervical spine, however, showed no predilection for miners. Heavy manual work, especially in the stooping position, was a factor in the development of disc degeneration in the lumbar region. Damp working conditions were associated with an increased frequency of symptoms, but not of radiographic changes. The survey showed forcibly the heavy toll, in terms of disability, taken by degenerative joint disease in miners.

Reviews of Books

Medical Problems of Old Age

A. N. EXTON-SMITH, M.A., M.D. Camb., M.R.C.P., physician, Whittington Hospital, London. Bristol: John Wright & Sons. 1955. Pp. 344. 30*s*.

Dr. Exton-Smith has produced a good book. He keeps closely to his avowed purpose of providing a textbook dealing with the medical problems of the elderly patient, yet he takes a wide view of the subject in a commendably small compass.

He starts with the aspects most likely to interest the general practitioner and health visitor or social worker, and he deals first with the old person at home—the opportunities there for the early recognition of morbidity and diagnosis of disease, for the maintenance of health, and for the application of practical measures to prevent accidents. He gives a whole chapter to the general principles of reablement after illness, with proper emphasis on the importance of assessing the patient from the physical, psychological, and social aspects, enlisting the relatives' help from an early stage, and the special influences, opportunities, and limitations of reablement in hospital. The reablement of the hemiplegic patient is considered more fully than in many larger works, but even so it is doubtful whether the student who has not worked with hemiplegic patients in physical reablement departments or in an active geriatric unit will learn much of practical value. The sections on the psychological and social aspects of reablement of the hemiplegic contain suggestions that are likely to be more helpful. Reablement of the arthritic patient is only briefly mentioned, but Dr. Exton-Smith does not overlook the value of occupational therapy and of exercises to improve personal independence. The chapters on medical and nursing care should also prove helpful, especially the section on restlessness.

It is increasingly recognised that age need not be a contra-indication to surgery; but Dr. Exton-Smith wisely indicates the special risks of surgery and the postoperative state for the elderly, and clearly presents the general principles determining immediate or delayed surgical intervention.

Throughout the book Dr. Exton-Smith shows a clear appreciation of the essential variations of disease in the elderly, compared with younger patients. He is especially helpful in assessing which, of a number of coexistent pathological conditions, is likely to call for preferential treatment.

Doctor against Witchdoctor

E. W. DOELL. London: Christopher Johnson. 1955. Pp. 216. 15*s*.

THIS book contains a number of stories based on the intense belief held by most Africans that disease is caused, not by the agents accepted by modern Western societies, but by malevolent persons using witchcraft. Dr. Doell obviously knows his subject, and indeed he has been faced with tragic examples of interference by witch-doctors which can at once be recognised as authentic by those who have practised in Africa.

The book does not leave a cheerful or optimistic impression. Traditional beliefs work strongly to prevent the application of modern methods of treatment, and still more of prevention; the idea of service to the sick in hospital is hard to instil in the nurses and hospital assistants, who may take up these professions for reasons far removed from the ideals we have painfully evolved. It seems at times impossible ever to lift this dead hand of fear which grips the Africans so closely from infancy onwards. Yet some of them have taken this frightening step towards a more rational conception of Nature, in face of the terrible threats inherent in the beliefs of witchcraft. It is surely early to expect more than a tentative acceptance of Western ideas, linked as they are in the African mind with an alien community. The premises which the African accepts from his tribal teaching lead him by valid logical processes to tragic, but not from his point of view criminal, activities. We can hope to change his outlook by persuasion and example, not by scorn and premature legal action. This book is a vivid and sincere contribution to a difficult subject.

Tubercle Bacillus in the Pulmonary Lesion of Man

GEORGES CANETTI, M.D., director of laboratory, Pasteur Institute, Paris. New York: Springer. London: Interscience Publishers. 1955. Pp. 226. 64*s*.

Dr. René J. Dubos and Dr. Walsh McDermott have done a valuable service in translating into English the enlarged and revised edition of Dr. Canetti's original *Le bacille de Koch*. The most important part of this book correlates the histology of different stages of pulmonary tuberculous lesions with the number of bacilli present in each type of lesion.

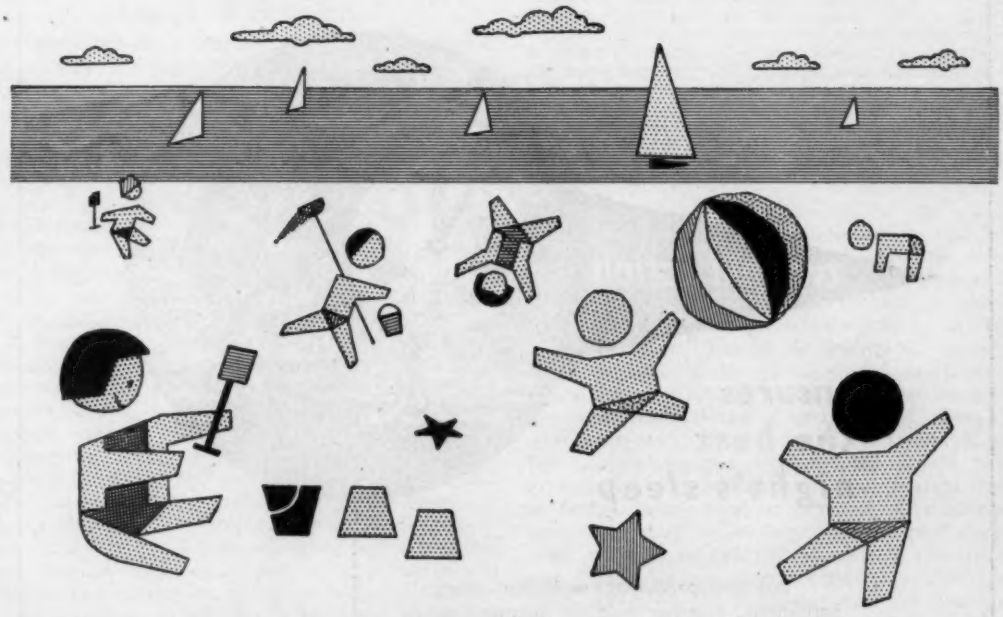
To accomplish this, Dr. Canetti has divided the lung lesions into a large number of types, but he is fully justified in doing so by the differing occurrence of bacilli in these types. At the same time, he recognises the difficulties of mixed-type lesions and of timing the incidence of each type. From this combined histological and bacteriological investigation, he goes on to discuss the pathogenesis of the lesions, and to consider the problems of hypersensitivity and immunity. He appositely quotes much of the older Continental work, now so often overlooked, and he examines therapeutic methods—rest, collapse, chemotherapy—in the light of his own studies.

Enough time has not yet elapsed since the introduction of chemotherapy for a full histobacteriological study of pulmonary lesions under different treatment régimes, comparing the changes with those before chemotherapy, but Dr. Canetti provides for future comparison an invaluable picture of the pulmonary lesions before chemotherapy. His book is no aid to the rule-of-thumb worker for treating individual cases, but it will be most thought-provoking and helpful to all doctors who are interested in the possible lines of progress of the tuberculous lesions in their patients, and the modifications of those lesions under therapy.

Textbook of Physiology (17th ed. Philadelphia and London: W. B. Saunders. 1955. Pp. 1275. 94*s*. 6*d*.).—This reliable and useful summary of present-day knowledge of physiology, originally known as *Howell's Textbook of Physiology*, now appears under the editorship of Prof. J. F. Fulton, who has himself written most of the chapters on the central nervous system. These are particularly good and up to date; but, rather surprisingly, recent observations on neurosecretion in the hypothalamus are not mentioned. The chapters on blood are good as are also those on metabolism and nutrition. The section on the circulation varies in quality, but it is useful to find discussion of the characteristics of blood-flow in a larger number of special regions than usual, including voluntary muscle and uterus. The chapters on the endocrines succeed in being both good and compact where it is only too easy to be diffuse. The book as a whole is readable and not merely a close-packed mass of facts; but it deserves a better index. The type is clear and agreeable, and, except for reproductions of some of the kymograph tracings, the diagrams are well printed.

Diseases Transmitted from Animals to Man (4th ed. Springfield, Ill.: Charles C. Thomas. Oxford: Blackwell Scientific Publications. 1955. Pp. 717. 90*s*.).—The new edition, by Mr. Thomas G. Hull, PH.D., of this valuable textbook contains a mass of information on all the diseases but one (foot-and-mouth disease) dealt with in previous editions, as well as seven new chapters describing such diseases as vibrio abortion, vesicular stomatitis, and Newcastle disease. It is enlivened by 104 illustrations, mostly of good quality, and a large number of diagrams and tables. This great task has been carried out by 25 authors, all well acquainted with their subjects; but we cannot help regretting that Dr. Hull has not directed attention to some of the fascinating problems presented by infections affecting both animals and man, such as the extraordinary differences in the effects produced by the same pathogen in different species, the effect of age, sex, and nutrition on resistance to infection, the tendency of certain pathogens to produce permanent parasitism, and the changes in "virulence" of many pathogens after they have become established in any country. With such questions in the forefront of their minds, general readers, of whom we hope there will be many, might well find this book a gateway into a strange, largely unexplored, and fascinating world.

IN "SUMMER DIARRHOEA"



Precisely how warm weather influences the incidence of infective diarrhoea in children is uncertain, but the increased number of flies and amount of dust makes it more likely that milk and food will become contaminated, while the rapid multiplication in warm weather of the various organisms known to be associated with the disease may lead to increased virulence.

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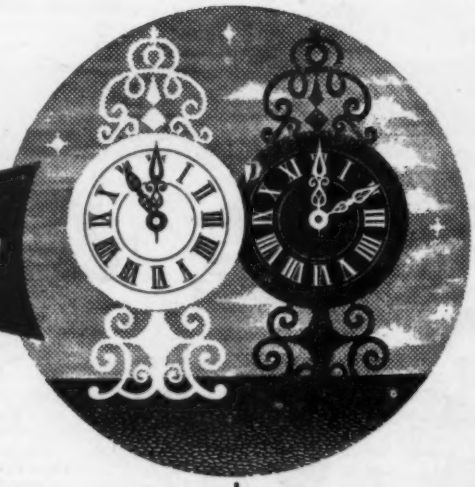

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THE LANCET

LONDON: SATURDAY, JULY 23, 1955

Design of Hospitals

AT the dawn of a new era of hospital building in this country, the publication of so important a book as *Studies in the Functions and Design of Hospitals*[1] is well timed, for it is an addition of great worth to our native—but meagre—literature on hospital planning. This report is not intended to be a general guide to the planning of hospitals; for its scope is limited to the investigation of certain services in the acute general hospital—the ward, the outpatient service, and the operating-theatre suite—and of physical factors appertaining to them, such as light, colour, warmth, ventilation, and the control of noise. Three further chapters deal with protection against fire (a matter which has been rather overlooked in the hospitals of this country); with general considerations which may affect design; and with planning to meet demand, treated as a statistical problem. On the practical side of the investigation, experimental buildings are being or will be erected at Larkfield Hospital, Greenock, and at Musgrave Park Hospital, Belfast, comprising two ward units, a twin operation suite, a central sterile supply, and an X-ray department. If it is to be of value, all new hospital building should be esentially experimental, and this report brings to us new and experimental methods of determining the data on which the buildings should be planned. No reader can fail to be impressed by the immense amount of careful research which the Nuffield team has done, and the report represents the first major attempt in this country to put the need for hospitals and their design on a factual and statistical basis. From the results of the time-and-motion studies made, structural plans have been evolved resulting in buildings which are more compact, and which should be more economical in capital and in maintenance costs, than those with which we are familiar. This is perhaps the main theme of the report; but there is also a great deal of varied information which will repay study by those who have hospitals to plan.

In any hospital, the psychological and physical needs of the patient are continuously in hidden—or sometimes open—conflict with the requirements of efficient administration, and somehow a reasonable balance has to be struck between the two. There is today a trend of thought which may well lead to giving the nurse—because of her scarcity value—precedence over the patient, and to evasion of the patient's deeper needs for the sake of administrative tidiness and convenience. The experimental ward units described in chapter 1 of the report are based primarily on time-and-motion studies of nursing duties, and from them structural designs have been evolved to ease the nursing burden and to reduce the capital and maintenance costs; but the time has not, of course, arrived when the questions "Do the patients like them? Do the staff like them?" can be answered.

1. Studies in the Functions and Design of Hospitals. Nuffield Provincial Hospitals Trust. London: Oxford University Press. 1955. Pp. 192. 63s. (in U.K. only).

In these ward units, the siting of the service rooms between the two halves of the bed area is unusual. It may be open to criticism on account of noise; for, however carefully sound-control is planned, the human element remains, and in hot weather doors may be left open and the washers-up may sing and whistle at their work, as they have done from time immemorial. A second point of criticism, especially of the Larkfield Hospital unit, may be the exposure of the patients in one half of the bed area to the traffic which must pass between the entrance of the unit and the service rooms. In the Musgrave Park Hospital unit this point seems to have been considered, for the patients are partially screened by cupboards and sanitary units. But the W.C.s are small and have no wash-basins, and if the patient wants to wash after using them—and he is given little encouragement to do so—he is likely to soil two doors on his way.

The factual basis of the design for the outpatient service—to some extent materialised in the Nuffield Diagnostic Centre at Corby—is founded on time-and-motion studies of the work of the doctors and of the movement of the patients in the clinics, combined with an investigation into the efficiency of appointments systems. The major finding of interest was that the work of the clinic moved more smoothly when the examination rooms were restricted to one per consultant instead of two or more. Since delay in the outpatient department is still a notable blot on the hospital service, this chapter should be read attentively. It would be interesting to know whether, in fact, a whole-time or a part-time medical staff gives the smoother service; for the part-time staff seem often to be delayed by outside commitments, and frequently too many consultants wish to hold their clinics on the same day and are unwilling to change because of outside engagements. This leads either to overcrowding and overwork on that day, or else to the provision of accommodation which is under-used at other times. In the chapter on the operating-theatre suite, special attention should be paid to the paragraphs on recovery rooms and the central sterile supply department. These are almost new introductions to this country, though abroad, and especially in America, there has been much experience of their use. Both seem to decrease risks to the patient appreciably, as well as giving some economy by the performance centrally, with trained teams, of procedures hitherto performed diffusely through the hospital by persons of no specialised skill.

In the search for exactness and reason in hospital planning, it is easy to forget that facts and figures are relatively inflexible and apply accurately only to the present or the past; until more is known, one should perhaps avoid taking them too literally in planning new hospitals which are to last for fifty or more of the years yet to come. The big difficulty of hospital planning is the unpredictable—the changing pattern of sickness; changes of policy in dealing with the sick; the rapid changes in medical and nursing techniques, the one deriving from the wealth of new discovery, the other from the poverty of personnel; and the movements of populations naturally or *en masse* as the overspill of urban districts. And there is the changing attitude of the patient himself towards the service which the hospital provides; for, as the standard of living, the level of wages, the degree of education, and the sense of individuality progressively increase, so he will become more critical and more demanding, even as the patient of today expects far

more than the patient of fifty years ago. To plan for today is perhaps not too difficult, but the real problem is to allow for the need of tomorrow. It may be that in the chapter on planning to meet demand there lies a germ of risk lest the content of new hospitals be based too rigidly on an ad-hoc survey of the statistical need at the time, whereas an additional examination of the records over a period longer than a year might indicate better the trends of need for the various hospital services in a particular area. We may add that, as most of the studies carried out by the investigation took place in the larger type of hospital, the results obtained from them are probably most appropriate to hospitals of similar type. Both here and abroad, a very large part of the total hospital work is done in hospitals of 200 beds or less, and in most of these the facilities are poor and working conditions—especially in outpatient departments—may be very bad. These smaller hospitals have problems of function and design peculiar to themselves; but, though in any symposium about hospitals it is almost always the large institution which gets prominence, it should not be impossible to apply the principles of this investigation to them, provided the scope of the services they are to offer has first been clearly defined.

Perhaps the chief merit of this report is that it is a record of research studies from which arise stimulating suggestions but no formal conclusions. It would have been easy enough to have used the results of this new approach for the prescription of standard units, leading eventually to standardised hospitals, with the added risk of sterilising original thought on the problems of caring for the patient. But this pitfall has been avoided, and the Nuffield Provincial Hospitals Trust has once again earned the thanks of all who are interested in hospitals, not only for the conception and performance of so valuable a research but also for the freedom of its method of presentation.

Reactions after Transfusion

WE now know enough about blood-grouping and cross-matching to keep dangerous reactions after transfusion down to a frequency of 1 in 1000 or less—and most of these reactions are due to blunders such as failure to check the name on the bottle against that of the patient. Hepatitis, which affects up to 1 in 150 recipients,[1] is a very serious complication that sometimes leads to death rapidly from acute hepatic failure or slowly from cirrhosis; and so far no means of preventing it has been discovered. There are other complications which rarely endanger life but distress the patient and alarm the clinician so that a transfusion may be terminated before all the blood has been administered. These less severe complications consist, firstly, in urticarial and other allergic reactions, which affect 1–2% of recipients, and, secondly, in febrile reactions, which affect 2–5% of recipients.

Different workers have sought to reduce the frequency of these minor reactions in different ways. GONÇALVES [2] remarks:

"emotional patients have had rigors, muscular tremblings, a sensation of impending dissolution, tachycardia, and a rise in temperature which start after 20–50 ml. blood and continue to the end of the transfusion . . . in patients whose central and vegetative nervous systems are normal, transfusion reactions are very mild."

And accordingly he administers an opiate before starting the transfusion. Others [3–11] have administered anti-histamine drugs before transfusion, and claim that this reduces the frequency of minor reactions by at least half. Two groups of American workers have now reported the results of controlled trials. One group [12] studied 3131 recipients, of whom 1616 received tripelennamine, and found that 3·4% of those who had received the drug, compared with 5·8% of the control group, had pyrogenic reactions: the odds against this being a chance difference are about 1 in 100. Allergic reactions, itching, urticaria, erythematous or maculopapular rashes, or œdema around the eyes developed in 47 (3·1%) of the control series, but in only 11 (0·6%) of those who had received tripelennamine. Secondly, in a blind trial WILHELM et al.[13] compared 474 control bottles of blood with 495 bottles to which had been added diphenhydramine hydrochloride. This addition did not affect the incidence of pyrogenic reactions (2·2%), but whereas there were 5 allergic reactions(1%) among the controls, there were none among patients who received blood to which diphenhydramine had been added. (Of 453 patients who received simple saline infusions 2% had a pyrogenic reaction and 1·1% an allergic reaction—an incidence almost identical with that after blood.) It is difficult to understand why 5·8% of the patients transfused in one hospital should have pyrogenic reactions, but only 2·2% of those transfused in another. Most hospitals report an incidence near the upper limit of this range—714 transfusions at one English hospital were followed by 36 pyrogenic reactions (5%) and 7 allergic reactions (1%). It seems reasonable to assume that the administration of anti-histamine drugs will reduce the incidence of pyrogenic reactions to 3½% or less, and will altogether prevent allergic reactions.

The choice of anti-histamine drug, and the method of administration, are still undecided. American workers have added the drug to the bottle of blood either soon after collection or just before administration; and one of them observes that the danger of bacterial contamination is minimised by adding the material immediately before transfusion. But this danger is averted altogether by administering the drug by mouth or by injection half to one hour before starting the transfusion; and this method also avoids another disadvantage of mixture with the blood—namely, that an effective dose is not given until the tripelennamine transfusion is half finished. As for the drug, tripelennamine, chlor-

1. Ginsberg, L., Sussman, L. N., Auerhan, H. *Surg. Gynec. Obstet.* 1951, **92**, 492.
2. Gonçalves, J. A. Congrès International de Transfusion Sanguine. Paris, 1954.
3. Hargreaves, M. M. *Med. Clin. N. Amer.* 1947, **31**, 803.
4. Ferris, H. E., Alpert, S., Coakley, C. S. *Amer. Practit.* 1952, **3**, 177.
5. Frankel, D. B., Werdner, N. *Ann. Allergy*, 1953, **11**, 204.
6. Weiss, S. *J. Student Amer. med. Ass.* 1953, **2**, 19.
7. Simon, S. W., Eckman, W. G. jun. *Ann. Allergy*, 1954, **12**, 182.
8. Alfonsi, P. L. *Gazz. med. ital.* 1952, **111**, 71.
9. Offenkrantz, F. M., Margolin, S., Jackson, D. *J. med. Soc. N.J.* 1953, **50**, 253.
10. Munoz-Barata, C. Congrès International de Transfusion Sanguine. Paris, 1954.
11. Ringenbach, G. *Ibid.*
12. Stephen, C. R., Martin, R. C., Bourgeois-Gavardin, M. *J. Amer. med. Ass.* 1955, **158**, 525.
13. Wilhelm, R. E., Nutting, H. M., Devlin, H. B., Jennings, E. R., Brines, O. A. *Ibid*, p. 529.

prophenpyridamine, methapyrilene, and diphenhydramine have all been recommended; some English hospitals have started to use mepyramine maleate and promethazine; and studies of diethazine and chlorpromazine have been promised.[11] In view of the high incidence of reactions in apprehensive patients, it would seem reasonable to administer an antihistamine substance with a powerful sedative action and a long-continued effect. A priori, promethazine, mepyramine maleate, or tripelennamine might be expected to prove suitable, and we hope that controlled trials of these will soon be made in Britain.

The Death Penalty

THE laws against witchcraft were repealed in this country in 1736; but they had been recognised, long before that, as an ugly piece of inhumanity, disgracing the statute-book. To many of our countrymen today, and to whole peoples of some European countries, the death penalty seems as grotesque as did the witchcraft laws to 18th-century Englishmen. The feeling against it has been intensified by three notorious executions within the last few years: that of Evans, who may not have been guilty of the crime for which he was hanged; that of Bentley, who was not guilty of killing but of shouting—in a moment of violent agitation—incitement to another to kill; and that of Ruth Ellis, hanged for a murder done in a state of acute jealousy. All these people were executed in accordance with our country's law, after fair trial; but their deaths have excited a great deal of uneasiness, not only among those who, in an emotional frenzy, stood outside Holloway gaol on the eve of July 13, shouting "Evans—Bentley—Ellis," but among many whose sober concern it is that the laws of this country should be as worthy as any and in the world, and among all who believe that an increasing preoccupation with murder trials and judicial executions is harming us as a people.

Capital punishment was abolished in New Zealand, Queensland, Denmark, Italy, the Netherlands, Norway, Sweden, and Switzerland, at dates ranging between 1870 and 1942; it remains legal in Belgium but (with one exception, in 1918) has not been enforced since 1863. Hence it is hardly surprising that the comment of other countries on the hanging of Mrs. Ellis has been adverse and outspoken. To the Swedish people our failure either to abolish the death penalty or allow it to fall into disuse seems barbarous. To the French it seems that we apply it with a blind disregard of differences in the circumstances and character of the crime. Tried in other countries, some of the people we hang would suffer only a short term of imprisonment; and though we may condemn such leniency, we can hardly fail to be impressed by the very wide discrepancy in current punishments for identical offences.[1] Evidence received from Denmark, the Netherlands, Norway, and Sweden by the Royal Commission on Capital Punishment, 1949–53,[2] indicated that murderers who, after their release from imprisonment, commit further crimes of violence are rare, whereas those who become useful citizens are common. Figures published in the white-paper on Capital Punishment[3] show that the same is true of reprieved murderers in this country. Unlike some other crimes, murder is seldom part of a recognisable life-pattern: it appears unexpectedly, probably taking even the murderer by surprise. The habitual murderers—the Smiths and the Christies, obsessed by some emotional abnormality—are fortunately rare.

The opinions of foreigners on our practice might weigh little with us as a people were we ourselves entirely easy about it. But public protests against the executions of Bentley and Mrs. Ellis make it quite clear that we are not. It has often been said, and is transparently true, that the death penalty punishes the innocent with the guilty. Not the criminal merely, but his whole family, endure the alternations of hope and fear which a murder trial imposes—a long-drawn-out anguish far more horrible than all but the worst of murders. Once the sentence is carried out, the punishment of the criminal is complete—but not the punishment of his family, who have to live with the memory and stigma of his execution. Mrs. Ellis leaves two young children, as well as her parents, to carry this unmerited burden. Such minorities deserve a voice. The children, who must inevitably be deprived of the "normal home life" of which we nowadays speak so glibly, have been dealt, in addition, a most shattering psychological blow. Any law which, in its enforcement, does gross injury to innocent people strikes at the whole concept of justice.

And not these children only, but many others have been harmed by the recent emotional orgy. A father at Holloway Prison gates lifted up his six-year-old daughter so that she could say she had seen the notice announcing the death of Mrs. Ellis. Children in a school near the prison are described by one of their teachers as being in a ferment: "Some claim to have seen the execution from their windows, others spoke with fascinated horror of the technique of hanging a female." Our means of communication are nowadays so efficient that the same unwholesome excitement was shared by children up and down the country. When an incident becomes the news of the day, presented at twenty million breakfast-tables, it becomes for the time an important part of our national life. The murderer, instead of quietly and decently receiving whatever deserts are deemed to be just, becomes the star of an immense and often long-remembered drama or even entertainment, quite frankly enjoyed by many people, and none the less because its horrors are true.

It is this aspect of the death-penalty which seems to us more dangerous and destructive than any other. As we said at the time of Bentley's hanging: "Whether an execution is actually seen or imagined the mental effect is qualitatively the same, and in our view the perpetual preoccupation with the condemned cell and the gallows is harmful to the mental health of society." We gild the worst of crimes with publicity, and associate it with an act of communal violence: small wonder if the youngsters swallowing the poison find the idea of violence dangerously attractive. Used as we use it, the death penalty may well be causing more crime than it prevents. Let us hope that those Members of Parliament who have launched a new attempt to get the law changed will succeed in freeing us from this recurrent demoralisation.

1. A woman in Corsica, found guilty, at about the same time as Mrs. Ellis, of the premeditated murder of a lover, was sentenced to two years' imprisonment and released at once on probation.
2. Report of the Commission, p. 229. H.M. Stationery Office, 1953. See *Lancet*, 1953, ii, 713.
3. Cmd. 7419.

Annotations

NITROFURANTOIN

ANTIBIOTICS have transformed medicine, but their shortcomings still make doctors scratch their heads. Even the broadest spectrum has its gaps and edges, and the most submissive organism may join a resistance group. Insensitive organisms and the development of resistant strains are common causes of trouble for the urologist, but owing to the synthesis of nitrofurantoin ('Furadantin') some of his difficulties may be eased. This drug is excreted in the urine, and 40% of an oral dose passes through the kidneys within six hours of its administration. With the usual dose of 500–600 mg. daily (5–7 mg. per kg. body-weight) an average peak concentration in the blood is 2·23 mg. per litre, and the peak is reached two hours after ingestion.[1] Nitrofurantoin seems to be almost free of toxic effects except nausea and sometimes vomiting, which can be lessened by giving the drug immediately after food. Experimental work and clinical trials have shown no evidence of damage to the liver, kidneys, or blood-forming tissues. Some experiments[2] suggest that the seminiferous tubules may be damaged, but trials in man have hardly supported this.

Studies in vitro show that a very high proportion of strains of *Escherichia coli* and of staphylococci are sensitive to nitrofurantoin. More important, proteus also responds quite well, but the concentration of the drug must be higher than for the other two types of organism. Unfortunately pseudomonas has appeared to be almost insensitive, except in the studies reported by Felton and Kemp.[3] Tube dilution tests suggest that nitrofurantoin is more rapidly bactericidal than tetracycline and chloramphenicol.

Clinical trials in the main bear out the laboratory studies. Waisbren and Crowley [4] treated sixty cases of urinary infection with nitrofurantoin. Proteus was eradicated from the urine in eight out of nine cases. Even with pseudomonas their successes amounted to eight out of fourteen, which is much more encouraging than the laboratory studies would indicate. On the other hand in eight cases pseudomonas and in six proteus appeared for the first time in the urine during or immediately after treatment with nitrofurantoin. In fourteen cases nitrofurantoin was judged successful after previous failure by various other agents, including 'Gantrisin,' oxytetracycline, and aureomycin; but in at least one case failure by nitrofurantoin (against a proteus infection) was followed by recovery after administration of chloramphenicol. Nitrofurantoin is evidently not a panacea; but it is a safe and promising drug for the treatment of urinary infections, particularly those due to proteus.

GLOSSOPHARYNGEAL BREATHING

THE difficulty in breathing experienced by patients with paralysis of the respiratory muscles due to acute poliomyelitis is well known; and any measure that may aid such patients deserves attention. Dail et al.[5] describe the use of glossopharyngeal breathing by postpoliomyelitic patients at the Rancho Los Amigos Hospital, California, where this mode of breathing has been extensively studied since 1951.[6]

In glossopharyngeal breathing the patient forces air into the lungs with the aid of the mouth and throat muscles. Apparently about ten mouthfuls of air can be forced down the trachea (and not down the œsophagus) until up to 600 c.cm. of air have entered the lungs; a single expiration expels this. The breathing cycle is repeated up to ten times a minute. Dail et al. state that some patients learn the technique easily and few fail altogether. Of 100 patients, ranging in age from 4 to 47 years, 55 were taught by hospital personnel, 25 learnt with little help from anyone, 15 learnt from other patients, and 5 learnt without being aware of what they were doing; but many weeks of hard practice are needed before this method is of real value to the patient. 69 of the patients used glossopharyngeal breathing to assist breathing; 31 to help in stretching the chest, coughing, and talking. It may enable the patient to breathe, at least for short periods, without respiratory equipment when he is otherwise wholly dependent on this, or to enhance spontaneous breathing when the capacity for this is very slight. Dail et al. do not recommend that patients with a tracheotomy who have no breathing ability should use the method when unattended, since if the tracheotomy plug becomes defective the patient is helpless.

This "built-in safety factor" requiring no mechanical equipment may obviously have physiological and psychological advantages.

Dail et al. regard the method as a help and not a hindrance in re-establishing normal breathing. It will no doubt be studied in many centres with a view to establishing its place in treatment.

DISASTER AT ASCOT

A DOCTOR can never shake himself wholly free of professional responsibility; for even on holiday he may come across a mountain accident, a car crash, or a mishap on a beach. He will act as best he can; and how good his best is may depend largely on the field in which he works. A few weeks ago we published a letter from the Widdicombe File [1] in which a laboratory worker vividly explained his unpreparedness and his doubts and difficulties in rising to an occasion. Non-clinicians who read his graphic account may have thought of it in relation to last week's accident at Ascot Races in which two people were killed and forty-six injured when lightning struck a wire fence near which they were standing. How, they must have asked, should I have dealt with this situation if I had been the only doctor on the spot?

The first step in such an accident should be to distinguish forthwith the injured with arrested respiration and possibly impalpable pulse. Attention to this group has precedence over all else, including the summoning of ambulances and further medical aid. The reason for this absolute priority is that unless artificial respiration is started within a few minutes these people will die, then or later, because of irreversible damage to the heart or brain. Maclaghlan,[2] for instance, found that the recovery-rate after accidental electrocution was 70% when artificial respiration was started within three minutes, but only 58% if four minutes or more had elapsed. Probably the best technique is the Holger-Nielsen,[3] because with the patient prone the airway is likely to remain clear, because this method provides a larger tidal volume than other methods, and because in electrocution the resilience of the lungs and thorax rapidly diminishes and concomitantly the efficacy of passive inspiration (as in Schafer's method) decreases. But the technique itself is of little importance compared with speed in starting artificial respiration; and where more than one person is injured the doctor should not immobilise himself by applying artificial respiration to a single patient but should supervise others. If enough trained first-aiders do not emerge at once, unskilled helpers should be impressed; and these will need constant checking to reduce the speed of artificial respiration to

1. Carroll, G., Brennan, R. V. *J. Urol.* 1954, **71**, 650.
2. Kaplan, J. H., Hobgood, R. *Ibid*, 1954, **72**, 549.
3. Felton, F. G., Kemp, A. P. *Ibid*, 1955, **73**, 718.
4. Waisbren, B. A., Crowley, W. *Arch. intern. Med.* 1955, **95**, 653.
5. Dail, C. W., Affeldt, J. E., Collier, C. R. *J. Amer. med. Ass.* 1955, **158**, 445.
6. Dail, C. W. *Calif. Med.* 1951, **75**, 217.

1. *Lancet*, 1955, i, 1322.
2. Maclaghlan, W. *J. industr. Hyg.* 1930, **12**, 291.
3. See *Lancet*, 1952, i, 548.

the required limit of, say, ten to twelve times a minute, and to desist when the return of natural spontaneous respiration is heralded by laryngeal movement or swallowing. In these cases patients may recover after as much as eight hours of artificial respiration.

The next step should be to move other casualties to cover, if possible, and to send for ambulances. The "burns" due to lightning, like burns proper, are best covered, if at all, with a dry dressing or (if removal to hospital is delayed) by a dressing moistened with sodium bicarbonate or saline solution; but no clothing, except that which is charred, should be removed, and the less burns are handled the easier will be the patient's subsequent course. Lightning may also cause other injuries, including severe lacerations [4]; and a simple dressing may be applied to these, too.

No doctor can be certain that he will not tomorrow face such an emergency as that described by our Widdicombe correspondent or that last week at Ascot. Many may doubt their competence to respond adequately. Might not local medical societies find it rewarding to devote an hour a year to the first-aid treatment of the injured on the mountains, on the roads and railways, in the countryside, and on the sea-shore? A doctor can save or lose a life in the first few minutes after an accident no less surely than by his actions or decisions in the operating-theatre, consulting-room, or laboratory.

DENTAL SERVICES

As a profession dentists are subject to more, perhaps, than their fair share of criticism, both from the public and from their medical colleagues. Recently at Oxford local dentists were denounced at a meeting of doctors for failing to operate an emergency dental service.[5] Reference was made to the Hippocratic Oath and the moral obligation it places on doctors to relieve suffering wherever they find it.

Dentists would agree, of course, that they are under a moral obligation to the community. But, with the profession so short-handed, there are limits to the responsibilities which its members can be expected to undertake. In view of the increasingly acute shortage of dentists, to organise a rota of practitioners "on call" throughout the twenty-four hours of the day and night to deal with dental emergencies might reduce rather than increase the useful service the profession can render to the public.

Though often dramatic and the cause of considerable suffering, dental emergencies are not at all comparable with medical cases, such as acute appendicitis, calling for immediate surgical intervention. Even dental hæmorrhage, which sometimes follows several hours after extractions, seldom has a fatal outcome. Except for the more serious cases of dental hæmorrhage, which should have prompt attention, there are few dental conditions which cannot safely be left untreated for a few hours. Hæmorrhage arising from dental extractions is the responsibility of the dentist who did the operation, and most dental practitioners will take the precaution of warning the patient to return immediately for treatment should such an emergency arise.

What seems to be necessary to improve the dental services under the N.H.S. is not, therefore, a twenty-four-hour emergency service, which could become an intolerable extra burden on a profession already stretched to the limit. Instead, if in every locality dentists would organise a rota and each in turn set aside an agreed proportion of his normal surgery time exclusively for the treatment of dental emergencies, it would almost certainly be found that night calls on hospital outpatient departments for the relief of toothache would be greatly reduced and a twenty-four-hour service would not be needed. Grave shortcomings of the present dental service are the long waiting-lists for appointments with dental practitioners and the long delay in some cases before even acute dental troubles are treated. There are far too few dentists to treat everyone, but the worst effects of this unfortunate situation would be mitigated if toothache and dental abscesses were promptly attended to. Medical practitioners and hospital outpatient departments would have copies of the rota of dentists on call and would know to whom to send patients whenever an emergency arose. Schemes of this kind are already in operation in some areas, and most dentists would agree that the profession owes at least so much to the community.

4. *Ibid*, 1946, i, 351.
5. *Oxford Mail*, July 1, 1955.

THE ACTION OF THE PARATHYROID HORMONE

THOUGH the precise mode of action of the parathyroid hormone remains unknown, a little progress has been made since we last discussed the subject.[1] Albright's original hypothesis that all the effects of the hormone could be explained by increased renal excretion of phosphorus has long since been abandoned—even by Albright himself [2]; but the opposite view, that the phosphate diuresis is an artefact,[3] has lost ground lately despite the evidence that part of the increase in phosphate output following administration of the hormone can be explained by a rise in the glomerular filtration-rate.[4] Last week, at the Ciba Foundation symposium on Bone Structure and Metabolism, Dr. John Eager Howard, who speaks with an authority second only to that of Dr. Fuller Albright, supported the view that one action of the parathyroid hormone is to diminish tubular reabsorption of phosphate; but he pointed out that in normal people the amount of this parathyroid activity is such that administration of additional hormone in standard dosage has little further effect on phosphate output.

The calcium-mobilising action of parathyroid extract is also firmly established, though we do not yet know how calcium is removed from the skeleton. To this problem Dr. Howard (whose remarks to the Bone and Tooth Society we report on p. 186) brought some fresh ideas which will stimulate further thought. He emphasised in particular the remarkable stability of the serum-calcium level, pointing out that whether this is high, low, or normal it remains the same in the face of drastic attempts to change it. Hastings and Huggins [5] have bled dogs, decalcified the blood, and returned it to the animals without lowering the serum-calcium level, even when half the calculated extracellular fluid calcium was removed. In normal animals the calcium level in the serum could not be reduced below 10 mg. per 100 ml., and in hypoparathyroid animals it remained equally steady at a level of about 6–7 mg. per 100 ml. Dr. Howard went on to quote the work of a previous speaker, Professor Engström, according to whom the total surface of the bone crystals must be some 30 acres. It is, he said, becoming increasingly clear that the equilibrium between the bone crystals and the tissue fluid must be the major factor in determining the serum-calcium level; and, since the latter is evidently regulated by the parathyroid hormone, it appeared probable that this regulation takes place at the interface between the crystals and the tissue fluid. In other words, Dr. Howard was suggesting that the hormone determines the level of tissue-fluid calcium at which it comes into equilibrium with the bone crystals. This is an attractive hypothesis, which seems to fit the known facts remarkably well. The prevalent concept of the osteoclasts as agents of the parathyroid gland, stimulated by it to "devour" the bone, may be too crude, but the osteoclasts could

1. *Lancet*, 1953, i, 79.
2. Ingalls, T. H., Donaldson, G. A., Albright, F. *J. clin. Invest.* 1943, **22**, 603.
3. Stewart, G. S., Bowen, H. F. *Endocrinology*, 1952, **51**, 80.
4. Klein, R., Gow, R. C. *J. clin. Endocrin.* 1953, **13**, 271.
5. Hastings, B. A., Huggins, C. C. 3rd Conf. on Metabolic Interrelations. Josiah Macy, jun., Foundation. New York, 1951.

be regarded as foreign-body giant-cells removing the matrix exposed by decalcification. The "halisteresis" of the older workers is coming into its own again.

Meanwhile the work of Gordon and Davies [6] has provided support for Dent's suggestion [7] that there may be two different parathyroid hormones. By dialysis they have succeeded in removing from crude parathyroid extract a factor which retains the phosphate-diuretic activity but no longer raises the serum-calcium level in laboratory animals.

EXPERIMENTAL TUMOUR CHEMOTHERAPY

THE search for cytotoxic compounds capable of causing selective regression of the tumour masses of reticuloses and malignant growths continues to stimulate to persistent endeavour the imagination and ingenuity of chemists in many lands. Reviews of the clinical successes and limitations of some of these substances have appeared earlier in our columns.[8 9] One of the most promising of the various compounds tested, "nitrogen mustard," derived from mustard gas, has formed the starting-point for combinations having other properties which might aid in the selective destruction of malignant cells. In the report of the British Empire Cancer Campaign covering the year 1952, Professor Bergel and his colleagues at the Chester Beatty Research Institute [10] referred to an aromatic nitrogen mustard derived from the amino-acid phenylalanine to which special attention was then being given. In 1953 and 1954 [11 12] it was recorded that the three optical isomers, D, L, and DL, of this compound had been synthesised. All were tested on grafts of the Walker rat carcinoma, and the L isomer proved the most effective. It was injected one day after transplantation of the carcinoma, and when its effect was assessed thirteen days later only one out of nine grafts had developed and this one weighed only 0·5 g. In this year's B.E.C.C. report, reference is made to further chemical and biological developments.[13] Clinical trials are also in progress.

Meanwhile, a group of workers in the Soviet Union, proceeding on parallel but slightly different chemical lines, have synthesised and tested the DL form of the compound. As recorded on p. 169, they obtained complete regression of an experimentally induced rat sarcoma with this preparation, which they have named sarcolysine. (It was less effective in trials using another rat sarcoma and mammary adenocarcinoma in mice.) Regression caused by sarcolysine is illustrated in fig. 3, the two sections of which are representative of 28 treated and 28 untreated animals; and the regression shown is truly remarkable because the tests were more stringent than any previously recorded. The grafts were given seven days' start, and at the time when treatment was begun their weight, as judged by untreated controls, was 0·5–0·8 g. The untreated grafts never regressed spontaneously, and at the end of the experiment on the twenty-eighth day their weight averaged 40 g. In those rats treated with three injections of 5 mg. per kg. body-weight, or with a single injection of 15 mg. per kg., no trace of the tumour cells of the grafts was found in sections taken on the twenty-eighth day, and three months later the hosts were still free of tumours. Some comparable observations with the Walker carcinoma were made at the Chester Beatty Research Institute in 1953 when (Professor Haddow informs us) 10 rats, each bearing an 8-day-old Walker carcinoma 256, were injected intraperitoneally with 0·5 mg. of the DL-phenylalanine mustard in arachis oil. The tumours regressed completely and the animals continued to live thereafter quite normally. This is the only instance yet observed at the institute of complete regression of an advanced Walker tumour.

In the Russian experiments the margin between the oncolytic dose and the dose lethal to the host was wide. But unfortunately, as so often happens in using derivatives of mustard gas and other chemotherapeutic substances, there was evidence of considerable damage to hæmopoietic cells as well as to those of the tumour. Encouraging though all these results are, they are but stages on the way to finding a substance both multivalent and selective in its destruction of tumours.

THE HOSPITALS OF PERTHSHIRE

SINCE the start of the National Health Service studies of the extent to which hospitals are used by the communities which they serve have been made in Stirlingshire (1948–49), in Ayrshire (1950), and in the North of Scotland. Now Dr. William Mackie, medical superintendent of the County and City of Perth General Hospitals, has done the same in his area.[1]

The counties of Perth and Kinross have a combined population of fully 135,000; they are predominantly agricultural, containing some of the most fertile land in Scotland. The eastern district of Perthshire turns largely to Dundee for its hospital needs, the Western area tends to drain to Stirling, and the southern and northern districts of the county look naturally to Perth for hospital services. Excluding mental hospitals and sanatorium beds, the total number of general hospital beds is 1385—equivalent to 10·2 beds per 1000 of the population. This proportion is much the same as that of the neighbouring county of Angus and considerably higher than those reported from the counties of Stirling and Ayr. Dr. Mackie found it difficult to calculate the "catchment area" which his hospitals might reasonably be expected to serve; some patients came from outside areas into the Perthshire hospitals, while many patients from Perthshire went to hospitals in Dundee and Stirling, and some doubtless to cities further afield. Roughly two-thirds of the patients discharged from the Perthshire hospitals in 1952 belonged to the counties of Perth and Kinross; but in the special departments the proportion of "local" cases varied. Thus over 90% of obstetric and geriatric cases discharged from hospital, and 82% of those attending the ophthalmology department, had their homes in the counties of Perth or Kinross, whereas the corresponding percentages for gynæcological cases and orthopædic cases were 43 and 41, and 36% of the E.N.T. cases.

Dr. Mackie suggests that a group of hospitals with enough beds to take 70–80 patients per annum per 1000 population can give a full hospital service to the community; but he recognises that the 82 discharges per 1000 population found in Perthshire does not necessarily reflect the true demand for hospital resources. An increase of beds, for instance, would raise the hospital ratio and reduce the waiting-lists. He concludes that, apart from the demand for more orthopædic beds, the catchment area served by the Perthshire hospitals has adequate hospital accommodation, especially since before long the area may be contracted by hospital building projects outside it and the development of a new Forth crossing.

Studies of this kind bristle with difficulty, and Dr. Mackie makes it clear that he has not analysed his material according to strict mathematical or statistical criteria. But he gives a comprehensive picture of the work done by the hospitals in the area, and a survey of this kind is an essential first step towards an intelligent review of hospital services.

6. Gordon, A. H., Davies, B. M. *Nature, Lond.* 1953, **171**, 1122.
7. Dent, C. E. *Proc. R. Soc. Med.* 1953, **46**, 291.
8. *Lancet*, 1954, i, 1118.
9. *Ibid*, 1955, i, 440.
10. Bergel, F., Ross, W. C. J., Stock, J. A., Everett, J. L. B.E.C.C. Annual Report for 1952, p. 27.
11. Bergel, F., Stock, J. A. B.E.C.C. Annual Report for 1953, p. 6.
12. Bergel, F., Stock, J. A. *J. chem. Soc.* 1954, p. 2409; see also Bergel, F., Burnop, V. C. E., Stock, J. A. *Ibid*, 1955, p. 1223.
13. B.E.C.C. Annual Report for 1954, p. 34.

1. Copies of the report may be had from the Nuffield Provincial Hospitals Trust, Nuffield Lodge, Regent's Park, London, N.W.1. 2s. 6d. (post free).

Special Articles

FAMILY DOCTOR AND HEALTH VISITOR*

Sir SELWYN SELWYN-CLARKE
K.B.E., C.M.G., M.C., M.D. Lond., F.R.C.P.
A PRINCIPAL MEDICAL OFFICER, MINISTRY OF HEALTH

SOME general practitioners who fully appreciate the work of domiciliary midwives and district nurses are not, I think, equally well aware of the help they can be given by health visitors. Many others, however, have come to value highly the contribution made by the health visitor, particularly in teaching a mother how to prepare for the birth of her child, and (once the responsibility has been handed over to her by the midwife or the maternity hospital) how to bring up the newborn baby; how and when to wean; how to guide the toddler in his first steps; and how to protect baby, toddler, pre-school child, school child, and adolescent from the many dangers of one sort or another which beset his path.

Where the general practitioner, the nurse, the midwife, and the health visitor have not yet begun to work together as what the Minister of Health has called "a proper domiciliary team," efforts should be made to break down the barriers between them; and it has become especially important to establish better contact between the doctor and the health visitor. A short while ago, a family doctor in North West London was telling me how a sherry-party had brought him, more or less accidentally, into contact with the health visitor in his area. He told me what a boon she now was to him with mothers who needed to be encouraged to persevere with breast-feeding, how much time she saved him in teaching his mothers where they could obtain all the various services available under the National Health and Assistance Acts, and from voluntary organisations, and, generally, in steering the mother away from the many pitfalls that face her—especially with her first child—in relation to food, clothes, bathing, play, exercise, sleep, teething, infectious diseases, and 101 other matters.

The health visitor knows, too, where to get help for patients discharged from hospital and needing aftercare, such as the diabetic and the tuberculous. If she is wise she will give relatively little time to the household which runs smoothly (or only needs a very occasional visit) and, by so doing, will be able to pay rather more frequent visits to the feckless type of mother who requires a good deal of guidance and encouragement and sometimes actual home-help or other services.

My friend told me that he has several old folk on his list who live alone; and when for any reason he is worried about them, and circumstances prevent him from looking in to see how they are faring, he rings up the health visitor and asks if she can call on his patient when she happens to be passing. For her part the health visitor, when in the course of her domiciliary visits she meets a situation where medical help is needed, will naturally telephone to the patient's doctor. This health visitor now has a standing invitation to call at my friend's surgery whenever she cares to do so.

This sort of friendly spirit is almost always present, I find, where home nurses and midwives are concerned; but, for historical reasons, it still sometimes takes a bit of cultivating in the case of health visitors.

Last month, when attending a liaison meeting between hospital and local health authorities, I was very agreeably impressed by the reception which three regional psychiatrists received from the health authorities present. The psychiatrists had appealed to them for help in connection with the placing and supervision of patients whom it was desired to send out on licence or on trial from the overcrowded mental hospitals and mental-deficiency institutions. The psychiatrists were promised every help; and here the health visitor obviously came into the picture. Health visitors assist in allaying the tension and anxiety young mothers so often experience with their first baby or when members of the household are in difficulty, and thus their talks to groups of mothers attending welfare centres are a particularly valuable preventive measure. Recently there has been discussion on the possible need for a psychiatric approach in child-welfare centres as a means of preventing undesirable behaviour patterns developing in the early formative years of a baby's life, from over-anxiety on the part of the mother or from wrong habits acquired by the child. Some local health authorities now employ a health visitor specially trained in psychiatry, who can act as a consultant, as it were, to her colleagues if they encounter psychological misfits in their family visits. I imagine this is just an extension of the specialised health visitor, as exemplified in the tuberculosis visitor whose work is so highly prized by chest physicians, especially for contact-tracing and in teaching people how to avoid spreading infection.

I firmly believe that the health visitor is capable, too, of giving a great deal of help in dealing with the aged. It is, I suggest, our duty to do everything within our power to keep elderly folk at home—near their relatives or kindly neighbours, and as closely as possible integrated with the whole community, including children—rather than encourage them to go to a welfare home or hospital. The health visitor going to see old people is in a better position than almost any other domiciliary worker to recognise early signs of deviation from normal and to seek appropriate help.

Nothing but good has derived from the extension of her work and responsibilities, since 1949, to the family unit as a whole. On the other hand, the very fact that her burden is greater suggests that the time devoted to mere routine visits at the 10th to 14th day after baby's birth, weekly during the first month, fortnightly for three months, and monthly up to the first year, and so on, needs modifying. As I have already indicated, visits should be relatively numerous to families where social and medical conditions are clamant and where the mother is not very bright, and should be correspondingly fewer to the happy, healthy, hygienic household with an intelligent mother at the helm.

In some rural areas the work of the health visitor is combined with that of the district nurse and even with domiciliary midwifery: so that many of the points I have tried to make are equally applicable to district nurses and domiciliary midwives. There are places, however, where the health visitor is in a position to relieve the district nurse of some of her social work, and where the heavy burden of purely nursing duties, especially for the aged, might be lightened if the district nurse were to enlist the help of her health visitor colleague when the situation appears to demand the utilisation of other (including voluntary) services.

Looking at the problem as a whole, I am convinced that we need a much closer integration of the work of district nurses, domiciliary midwives, health visitors, general medical practitioners, local health and welfare authorities, hospital authorities, and voluntary organisations. Each of us individually can do something to bring this integration about; and it can indeed be brought about in no other way than by our action as individuals.

* Extracts from an address to the health staff of Northampton County on Dec. 31, 1954.

BONE STRUCTURE AND METABOLISM

THE increasing interest in bone structure and metabolism was reflected in a well-attended meeting at the Royal Society of Medicine on July 15. Under the chairmanship of Prof. R. A. MCCANCE, F.R.S., five of the visitors from abroad who had taken part in a highly successful symposium at the Ciba Foundation were invited by the Bone and Tooth Society to report on recent work in their own fields.

Prof. A. ENGSTRÖM (Stockholm) has been applying biophysical methods to the study of bone structure. Micro-radiography has shown that the haversian systems of compact bone are mineralised to varying degrees, and that those with the lowest mineral content have the highest uptake of radioactive isotopes. X-ray diffraction studies seem to have confirmed the hydroxy-apatite nature of the bone salt. The apatite crystals measure about 220 × 70 Å and possess an enormous surface —about 130 sq. m. per gramme. Professor Engström expressed the view that the carbonate ion is not incorporated in the lattice but is merely adsorbed on the surface. He referred also to the new syndrome of hypophosphatasia, and demonstrated the low uptake of ^{45}Ca by a piece of bone from one of these cases. "In this condition," he said, "the matrix cannot become properly mineralised."

Dr. JOHN EAGER HOWARD (Baltimore) opened his remarks on parathyroid function by observing that very little is known about the parathyroid hormone—we do not know its chemical structure, where it acts, or how it acts. But clearly, he said, it has some action on phosphorus metabolism, and work had been presented to the symposium which showed that the phosphate clearance is high in hyperparathyroidism and low in hypoparathyroidism. The work of Barnicot, confirmed by Chang, had shown that there is also a direct action on bone, leading ultimately to the picture of osteitis fibrosa. The parathyroids seemed to be stimulated by a fall in serum-calcium. They hypertrophied in low-calcium rickets but not in high-calcium rickets, and more activity could be obtained after perfusions with low-calcium fluids than high-calcium fluids.

Dr. Howard then developed a new conception of the mode of action of the parathyroid hormone. He pointed out that the serum-calcium is extremely constant—at about 10 mg. per 100 ml. in normal individuals, and at higher and lower levels respectively in hyper- and hypoparathyroidism. Since 99% of the body-calcium is in the skeleton, and since the bone crystals present an enormous surface to the tissue fluids, it must be the over-all relationship between the tissue fluid and bone crystals which determines the level of serum-calcium. If movement of calcium into bone exceeds loss from bone, the serum-calcium must fall, and vice versa. The secretion of the parathyroids must obviously be important in regulating the equilibrium between the tissue fluid and the bone crystal, or in setting the level at which the homœostatic mechanism operates. "The parathyroid gland must regulate the living barrier between the bone salt and the tissue fluid."

Prof. G. FANCONI (Zürich) described five principal effects of vitamin D, and brought in the conception of varying degrees of sensitivity to it to explain a series of disorders ranging from idiopathic hypercalcæmia to vitamin-D-resistant rickets. He pointed out that there is a familial disposition to rickets (suggesting decreased sensitivity) and that hypothyroid subjects do not develop the disease (i.e., they are more sensitive than normal to the vitamin). He described the relatively new syndrome of idiopathic hypercalcæmia with osteosclerosis, and reported the favourable effect of cortisone in this condition.

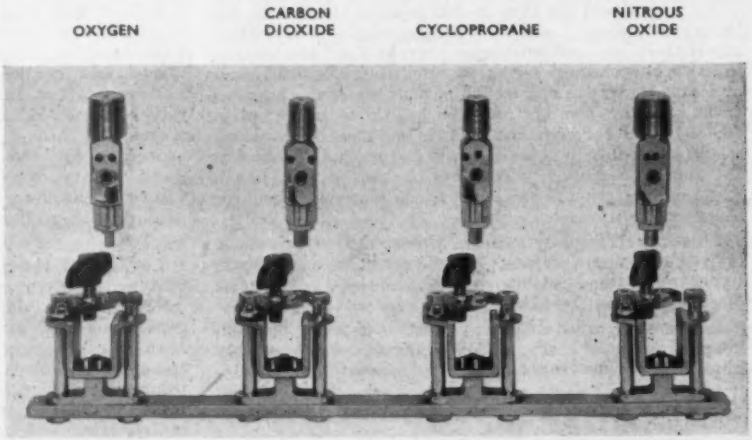
Prof. W. D. ARMSTRONG (University of Minnesota) described "some very simple experiments" which in his opinion supported the view that the homœostatic action of bone is more important than its function as a supporting organ. He believes that citrate occurs "adventitiously" in bone, and reported that dry fat-free bone will take up citrate ions from solutions in vitro. However, there was evidence that both phosphate and fluoride ions compete with citrate ions if they are present in the solutions, and he interpreted this as meaning that all these ions are adsorbed on the surface rather than incorporated in the lattice.

The meeting concluded with a paper by Dr. H. LISCO (Chicago) on the deposition of radioactive materials in bone. He emphasised the importance of the skeleton as the store-house of fission products, and showed radiographs and histological sections of the bones of patients who had died with a "radium burden."

NON-INTERCHANGEABLE GAS-CYLINDER VALVES

DESPITE precautionary devices, mistakes in identifying medical gas cylinders have cost many patients their lives. At present each cylinder is clearly labelled with the name of its contents, and cylinders are distinctively coloured to distinguish one gas from another. Large cylinders, such as are used for pipe-line installations, already have valves of a type which makes it impossible to connect them up incorrectly; and now the British Standards Institution has announced the adoption of a measure to avoid the risk of wrongly connecting cylinders with a capacity of 24 c. ft. or less.

The principle of the new system is that of the radio valve. The connection pieces of each apparatus are to be made with two pins which will fit into two holes in the valve of the gas cylinder. The pins and corresponding holes will be spaced differently for each type of gas (see figure). An identical valve is already in use in the U.S.A. and in Canada, and it is likely to be adopted by many European countries in due course. In this country it will be available on new equipment before the end of this year, but the conversion of existing apparatus and cylinders will not start until the autumn of 1956.



The introduction of the non-interchangeable valve will close one more loophole due to human frailty, and prevent the accidental junction of the wrong cylinder with the connection piece of any apparatus. Many types of apparatus, particularly for anæsthesia, have detachable tubing to carry the gases from the connection pieces and the pressure-reducing valves to the meters which record their flow. These, too, should be fitted with non-interchangeable couplings.[1] But complete safety can still only be secured if practitioners never use any gas apparatus until satisfied that all its connections are correct.

EFFECTS OF ATOMIC AND HYDROGEN BOMB EXPLOSIONS

AT the suggestion of the Japanese Association of Doctors against the A and H Bombs, an international medical commission was set up to investigate the medical and biological effects of atomic explosions. Help in the organisation of the commission was given by the World Medical Congress for the Study of Contemporary Living Conditions. The Japanese sponsors included Dr. M. Tsuzuki, emeritus professor of surgery in the Tokyo Imperial University; Dr. Hideo Kumabe, director of the Anti-tuberculosis Association of Japan; and Dr. H. Shiga, of the Japanese National Institute of Public Health.

The members of the commission, who served in their personal capacity, were:

P. CHEVALLIER, professor of hæmatology, Faculty of Medicine, Paris.

G. W. GALE, professor of preventive medicine, University College of East Africa, and former secretary of health and chief health officer, Union of South Africa.

F. GIETZELT, director of the radiological institute and tumour clinic, Charité, Berlin.

L. GUZMAN, professor of oncology, University of Chile; formerly director-general of public health, and at one time prime minister of Chile.

K. HOLUBEC, chief of the surgical department, Trebic Hospital, Czechoslovakia.

A. V. KOZLOVA, director of the Molotov Institute of Radiology, Moscow.

PAI HSI CHING, professor of pathology, China National Medical University, Mukden.

S. SEVITT, consultant pathologist, Birmingham Accident Hospital and Burns Unit.

J. VONCKEN, surgeon; chairman of the Belgian Society of International Law.

The members of the commission met in Tokyo on May 28, 1955, and sessions were held in Tokyo, Osaka, Kyoto, Hiroshima, and Nagasaki. They hope in due course to prepare a full report on the evidence supplied by Japanese scientists, supplemented by their own observations and their interrogation of survivors who include several doctors. Meanwhile, they have issued a preliminary report whose conclusions are:

"The rapid release of vast quantities of energy and fissionable material from the explosion of atom and hydrogen bombs has produced severe effects in exposed human beings. Most of those affected have died. Those who survived commonly suffered or suffer from various after-effects and many cases of blood disease terminating fatally have already occurred among them. Pregnant women frequently miscarried. Some children who were exposed have been retarded mentally and physically. The study of these various effects should continue and periodic international conferences convened to evaluate the results.

"We consider that the persistence of radioactive contamination of the sea, rain, and atmosphere is the most important feature of experimental H-bomb explosions, for we are afraid that the cumulative effects of increased irradiation over widespread areas may result in unfavourable genetic changes among the populations of those areas. We are members of a profession whose duty it is to defend the public health against any threats to it which can be prevented. As doctors we appeal to the mutual understanding of nations and the good sense of mankind to ensure that there shall be no further explosions of atomic and hydrogen bombs, and that the use of atomic energy shall be confined to peaceful and constructive purposes for the benefit of all the peoples of the Earth."

1. Medical Gas Cylinders and Anæsthetic Apparatus. British Standards Institution, June 22, 1955 (B.S.1319).

GENERAL MEDICAL COUNCIL

MEDICAL DISCIPLINARY COMMITTEE: JULY 12–13

THE Medical Disciplinary Committee of the council met on July 12 and 13, under the chairmanship of Sir DAVID CAMPBELL, the president.

MISLEADING STATEMENT

Jack Isaac Conroy, registered as of Willow Bank, James Street, Radcliffe, Lancashire, M.R.C.S. (1932), was charged with having sent a statement purporting to have been made by his assistant, Dr. Ian Clark, but altered by himself, with the intent of misleading the Lancashire Executive Council in connection with a complaint made against him. He was represented by Mr. P. Baylis, solicitor, of Messrs. Hempsons, solicitors to the Medical Defence Union.

Mr. G. J. K. Widgery said that Dr. Clark was asked, in Dr. Conroy's absence, to see a patient whom he found to be suffering from pneumonia. Subsequently the patient's wife complained to the executive council of neglect of her husband by Dr. Conroy. A copy of the complaint was sent to Dr. Conroy for his observations, and he asked Dr. Clark to make a statement about the case. Dr. Conroy wrote to the executive council including a statement purporting to have been made by Dr. Clark. When Dr. Clark was shown a copy of this by the complainant, he told her that it was not his statement and notified the executive council. The patient's wife withdrew her complaint against Dr. Conroy, but the medical services committee investigated the matter of the statement. The committee found that this had been altered by Dr. Conroy. So far as the statement was concerned there was no breach of the terms of service but they ordered that the papers in the case, together with their report, should be forwarded to the General Medical Council. Dr. Conroy's appeal to the National Health Service Tribunal was dismissed.

In evidence Dr. Clark said that "everything had been toned down from what I had described" in the statement which Dr. Conroy sent. Cross-examined, Dr. Clark agreed that Dr. Conroy had admitted at once that he had completely redrafted the statement.

Dr. Conroy told the committee that, as a result of advice from the Medical Defence Union, he asked Dr. Clark to prepare a statement of the case so far as he was concerned personally. When he read the statement he realised that it did not embody the fact that he had been in consultation with Dr. Clark. He drafted a new statement embodying what he thought was necessary to repudiate the allegation. He intended it as a statement of what Dr. Clark would say at the oral hearing by the medical services committee. He invited Dr. Clark to draw the attention of the executive council to any errors in the statement as submitted.

The committee found the facts alleged against Dr. Conroy proved to their satisfaction, and judged him guilty of infamous conduct in a professional respect. They were unable to regard the statements made on his behalf as affording any justification for his action, but they hoped that the warning which he had received from these proceedings would be sufficient, and did not direct the Registrar to erase his name.

BLACKMAIL

Ralph Austin Hamilton Dubery, registered as of Stowford Lodge, Umberleigh, Devon, M.R.C.S. (1942), had been convicted at Devon Assizes and sentenced to three years' imprisonment. Mr. Widgery said that the charge was one of blackmail of a patient. Dr. Dubery's appeal was dismissed and the sentence upheld. In 1935, when he was 17, he was found guilty of causing a public mischief and bound over; he made up a story to the police of a burglary.

Dr. Dubery said that he had put in a petition to the Home Secretary that further evidence should be heard. The Legal Assessor (Mr. C. P. Harvey, Q.C.) told him that the committee were bound to accept the conviction. Dr. Dubery replied that if he was in fact guilty of the offence there was very little,

if anything, which he could say in mitigation. He could only repeat that he was not guilty, and he had evidence which would prove that he was in fact innocent.

Dr. R. A. Nash gave evidence as to character and presented a petition from 2700–2800 people in South Moulton.

The Registrar was directed to erase the name of Ralph Austin Hamilton Dubery. This is subject to an appeal to the Privy Council within twenty-eight days.

HEARING POSTPONED

Bak Hin Ong, registered as of 10, Riverside, Malacca, L.R.C.P.E. (1915), had been summoned to appear following a conviction in Malaya. He did not appear, and on his behalf Mr. Baylis, in his private capacity, applied for an adjournment on the ground that Dr. Ong had been unable to make arrangements to come to London for the present hearing. Mr. Widgery suggested that Dr. Ong had had ample time to prepare for the case. The Royal Faculty of Physicians and Surgeons of Glasgow had withdrawn Dr. Ong's licence in view of the fact that his name had been removed from the register in Malaya.

After consideration in camera the President announced that the committee had, with some reluctance, decided to postpone the case until their November session.

UNTRUE CERTIFICATES

William Mackenzie Ross, registered as of Sunnyside, Flint, M.B. Edin. (1924), was charged with issuing 29 certificates for National Insurance purposes which were untrue, misleading, or improper within the meaning of the Warning Notice. The certificates were first, intermediate, and final certificates in support of claims for sickness benefit.

Mr. Widgery said that the certificates of incapacity for work were in respect of a patient, George Jones. They were given to his wife, Mrs. Jones, without her husband's knowledge. She obtained insurance benefit totalling £72 2*s*. 9*d*. In May of this year she was fined £20. The medical services committee found that Dr. Ross issued the certificates in contravention of the National Insurance Benefit Regulations and recommended that £580 be withheld from his remuneration; on appeal the amount was reduced to £250.

Mr. George Jones told the committee that during the period covered by the certificates he was carrying out his normal work. Cross-examined by Mr. Baylis, who represented Dr. Ross in his private capacity, he agreed that he had had a number of "off-work" certificates from Dr. Ross.

Mrs. Alice Gwendoline Jones said that, apart from the war-time, she had been Dr. Ross's patient since she was 16. She told him that her husband was ill, and asked for the certificates, signed these with her husband's name, and obtained the benefit. In cross-examination Mrs. Jones said she had told Dr. Ross that her husband was not always kind to her. She agreed that she got the certificates by playing on Dr. Ross's sympathy.

Dr. Ross said that he had not given the first certificates without examining the patient, except in one instance, when he had seen Mr. Jones a little while before. He believed Mrs. Jones when she said that her husband was ill. He agreed that she had quite ruthlessly and wilfully deceived him. He had no motive, apart from sympathy, in giving the certificates and derived no benefit from them. He did not know that Mr. Jones was at work.

Mr. Baylis said that Dr. Ross had had no motive except to help the patient's wife, for whom he was sorry. He was not putting that forward as an excuse; he had issued 25 certificates without seeing the patient. But he had no improper motive.

The committee found the facts alleged in the charge proved. Mr. Baylis produced three testimonials from doctors in Dr. Ross's neighbourhood. After deliberation in camera for nearly an hour, the President announced that Dr. Ross had been found to have been guilty of infamous conduct in a professional respect. "The committee regard your action in giving these certificates as a most serious breach of the trust which Parliament has confided in members of the medical profession," said the President. "Not only our own repute but that of the profession to which you belong must be injured by actions of this nature." But in view of the testimony which had been produced and the assurance that Dr. Ross had given concerning his future conduct, the committee did not direct the Registrar to erase his name.

MEDICAL RESEARCH COUNCIL

FOR their annual report the Medical Research Council have evolved a pattern which avoids the danger of overmuch detail and still presents a readable picture of what is going on. In recent years the main part of the report has included some discussion of general trends in medical research, often from a broader standpoint than that of the contributions made by work within the council's own programme. Such a scheme must inevitably fail to mention many of the investigations in which the council's workers take part; but by judicious choice of topics from year to year the council aim to deal with all important subjects of study once every few years. After this general account of what has been happening in several branches of research, the report adds a summary of the work of the separate establishments, and for more details those interested can turn to the classified list of references which follows.

CHEMOTHERAPY

Chemotherapy has been one of the big interests of the council since 1928, when they set up a committee, under the chairmanship of Sir Henry Dale, to advise them on this subject; and the newly published report [1] for 1953–54 (the Ehrlich-von Behring centenary year) appropriately starts with a review of what has been achieved since then. Looking back over these busy years, the report makes this reflection:

"In retrospect it seems that the necessity for close collaboration between chemists and biologists in chemotherapeutic research should have been so obvious as to be universally recognized from the outset. That it was not so recognized was due in part to the absence of any underlying theory, and to the fact that discoveries made by chance or on the basis of meagre evidence and sometimes very dubious reasoning seemed to indicate that the prospects of developing a comprehensive theory were remote. In these circumstances the large-scale, semi-empirical method of screening new synthetic organic compounds appeared to offer the best chance of success."

The different outlook that prevails today stems from Domagk's discovery of the antistreptococcal action of prontosil and from the increase in our knowledge of the biochemistry of micro-organisms. The report goes on:

"... biological research has invigorated the whole subject of chemotherapy. From bacterial biochemistry there is emerging a satisfying theoretical background for the work. In the search for new synthetic chemotherapeutic drugs we may expect to be guided in general by this theory and in detail by increasing knowledge of the biochemistry of bacterial metabolism, and by the results of study of the mode of action of naturally occurring antibotics. The conception of chemotherapeutic agents has been widened to include drugs that may exercise their effects through the host rather than directly on the parasite, and the development of this aspect is being assisted by investigation of the cellular metabolism of higher animals. Chemotherapy has travelled a long way since the days when it amounted to little more than the empirical selection and biological testing of organic compounds, whether already known or specially prepared for the purpose."

RETROLENTAL FIBROPLASIA

The remarkable story of this disease may fairly be pronounced closed, though, as the report says, sporadic cases may appear in the future as they did before 1942—the year in which Terry, of Boston, called attention to the increase in bilateral blindness in premature infants. Work in this country made notable contributions to the solution of this problem, and the latest results to be recorded, both here and abroad, confirm that the curtailment of oxygen administration to premature babies has greatly reduced the incidence of retrolental fibroplasia. Moreover, the reduction of oxygen has had no deleterious effect upon the survival-rate.

MALNUTRITION

There have been two currents of thought on human malnutrition in recent years—on the one hand, the

1. Report of the Medical Research Council for the Year 1953–54. H.M. Stationery Office. Pp. 274.

deficiency viewpoint (with vitamins in the forefront) and on the other, the idea that disease must result from the action of a positive agent such as a bacterial infection or some poisonous substance. The report points out, however, that nutritional disease is no longer a question of mutually exclusive concepts, but rather that both types of stress—the nutritional and the infective—may be operating together to produce deviations from the normal pattern.

"... it is clear that the study of human malnutrition is no longer the clear-cut investigation of disease entities; it is the study of the reactions of the individual throughout his life-span to what may be termed the chemical environment imposed by his diet. This study must properly be considered a branch of human physiology as well as of pathology, since it is concerned not only with causes of death and with the altered patterns of disease which are found in malnourished peoples, but also with the suboptimal performance and efficiency, which, in the long run, may well be the most important effects of marginal malnutrition."

NEUROSIS IN INDUSTRY

The council's unit for research in occupational adaptation, directed by Prof. Aubrey Lewis, has been making systematic observations upon the consequences of neurotic disturbances on social well-being and industrial efficiency.

A study in a light-engineering factory showed that the group with the consistently higher level of production contained more stable and emotionally mature persons than another less productive group, it was more closely knit, and it had a better record of general health. Surprisingly, the group which was less healthy and industrially less effective had less absenteeism than the other, so that in this study absenteeism was paradoxically associated with a higher standard of occupational efficiency.

The report emphasises the difficulties which the psychiatric research-worker must face.

"If his clinical, social and psychometric examination of each worker is to be adequate, it is impossible to examine a large population; but unless his examined population is large, his findings will be inconclusive. He must examine his subjects during a comparatively short period, since economic changes in the industries studied may otherwise affect his results differentially. When he uses the survey method to study a working group he cannot feel confident that his conclusions will apply to different groups working under other conditions, since the number of people studied in such a survey can represent only a small percentage of the labour force.

"Field studies ... provide useful descriptive material and suggest valuable hypotheses on which further work can be based. But much surer and simpler methods of examination and assessment need to be devised before such surveys can yield conclusions of general validity on the connexion between occupational behaviour and psychopathic traits."

SUPERANNUATION RIGHTS OVERSEAS

THE Minister of Health has arranged [1] that British hospital doctors, dentists, nurses, and other professional, technical and administrative staff who accept employment at the new University College Hospital, Ibadan, Nigeria, shall not lose their National Health Service superannuation rights. This is the first time that provision has been made for employment in a hospital outside England and Wales to carry with it N.H.S. superannuation. The new direction, which came into operation on June 23, applies to those who accept employment with the University College Hospital, Ibadan, for not longer than six years and who have been employed by a regional hospital board or board of governors within the previous twelve months. The hospital will be opened in 1956 or 1957 and for some years will be dependent on recruitment from the United Kingdom for filling many of its higher professional technical and administrative posts.

1. Ministry of Health: Circular H.M.[55] 69.

Public Health

THE HEALTH-DEPARTMENT PSYCHOLOGIST

HIS RÔLE IN A MENTAL-HEALTH SERVICE

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LOCAL health authorities need to think seriously of taking on new responsibilities for mental health. Partly because of the difficulty of staffing our mental and mental-deficiency hospitals, the emphasis is swinging away from the hospitals to the idea of extended community care; and to undertake this the local authorities will require specialist staff.

The employment of a full-time psychologist in community work is new in this country, and it may be useful to describe my experience in the Oldham public-health department, during the past three years.

It has, of course, long been the practice for educational or clinical psychologists to take part in child-guidance, where their knowledge of normal and developmental psychology, and of statistical and mental test procedures, has supplemented the psychiatrist's knowledge of medical psychology. Nowadays, psychologists are working, too, in mental and mental-deficiency hospitals, and in some of the larger general hospitals, where pædiatricians, physicians, and neurosurgeons use their findings in assessing the needs of patients, in evaluating the results of treatment, and in planning rehabilitation.

Work in the public-health department, however, is quite a new venture for the psychologist, and it brings into a novel context many problems with which he has been familiar more generally. In particular, he is likely to be called in at an early stage in the ascertainment of mental deficiency—not necessarily in a clinical setting, but in the home also. He has opportunities for helping and working with defectives and mental patients in the community. He is in close touch with medical and consultant staff of the department, with duly authorised officers, with mental-health social workers, and with health visitors. Though he will probably be engaged in certain school health duties his proper position in the department is as a member of the mental-health team, and the scope of his work can thus be wide.

These commitments will vary from one area to another, and local needs and hospital facilities will determine how such a service develops. In Oldham there is close integration between the public-health and hospital psychiatric services, on the one hand, and the educational services on the other. This enables a system of joint use of officers to operate, with benefit to the efficiency of the service as a whole, avoidance of duplication of effort, and economy in expenditure. The social work for the hospital psychiatric unit and clinic, including group and recreational therapy, is done by the mental-health staff of the health department. Direction is given by the consultant psychiatrist to the hospital, who is also consultant to the health department, mainly by means of a weekly case-conference, when recommendations and decisions on aftercare and the helping of patients in the community are made. The emphasis, so far as possible, is on community care, and admission to hospital is considered only for cases urgently in need of it.

In such a unified and integrated community mental-health service, the work of the psychologist is divided between (*a*) the public-health department, (*b*) the school health service, and (*c*) the hospital—and these varied duties overlap.

THE HEALTH DEPARTMENT

Diagnosis of mental deficiency comes naturally to the forefront, since this is work in which psychological tests are essential. With children the commonest problem is that of "educability." A child's whole future will depend on whether he is regarded as educable, since the verdict "ineducable" excludes him from the school system. Very careful consideration must therefore be given to the child's history, opportunities, and circumstances, to the diagnosis of his mental condition, and to the methods used in arriving at that diagnosis. School medical officers may find such decisions difficult, and may refer the child to an independent consultant. It saves time, energy, and expense to have a psychologist available in the health department, who by virtue of his background and training is particularly suited to assist.

Where the problem is whether an adolescent is likely to need supervision after leaving school, and is therefore subject to ascertainment as a mental defective, the answer depends entirely on the validity of the diagnosis; and skilful testing and test interpretation, as well as very careful consideration of social circumstances, may be required. Objective personality testing might prove to be of value.

Adults suspected of being mentally defective, who may have missed ascertainment at school, quite often come to the attention of the local health authority, either through the courts or through social agencies. A typical example is the unmarried mother of low mentality who may have led a tolerably useful and socially acceptable life until the arrival of her child put too great a burden on her intellectual resources. In cases of this kind assessment often requires diagnostic procedures not normally applicable to children. In Oldham it is the practice for all adults suspected of being defective to be seen and assessed by the health-department psychologist, whose findings and report, accompanied by a detailed medical and social case-history, may then be passed on to the consultant in mental deficiency. This procedure has considerably reduced the time spent in diagnosis and disposal.

Defectives under Community Care.—Guidance of defectives under supervision or guardianship in the community calls for careful assessment of their capabilities and potentialities. This means more than merely testing on a single test and expressing the findings in terms of intelligence quotient or mental age. It should include the detection of special strengths and weaknesses in mental functioning quite apart from general intelligence.

This type of work has particular value in the running of an industrial centre, which should have as its objective the training and rehabilitation of selected defectives so that a proportion of them may find remunerative employment. Occupational maladjustment is often associated with disturbances of conduct or precipitation of mental illness; and this is a danger which particularly needs to be guarded against with employable defectives. Such assessment is, to a large extent, the province of the psychologist. Initial assessment of mental capabilities and disabilities is carried out by him, and, in coöperation with mental-health visitors and instructors, he follows the progress made by the defectives under training and tries to estimate end-results in an objective way. In many problems of actual training procedure he may be able to advise and assist, especially if he is acquainted with the techniques of industrial or occupational psychology. Special test procedures and the application of statistically reliable rating reports may be wanted.

More needs to be known about the occupational potentialities of defectives, and there is room for research in a community setting.

Psychometric assessment of mental patients is often necessary, because mental symptoms are sometimes the result of specific intellectual inadequacies, not necessarily amounting to mental defect but nevertheless requiring thorough objective assessment. Personality testing by means of special techniques is another contribution which the psychologist in a community service can make.

Home Visiting.—The psychologist in a community service should be available for visiting patients in their homes, and for the visiting and supervision of mental defectives. From time to time he may be required to help with other administrative matters which come within the province of the mental-health visitors. This is a useful and often necessary extension of his work. It gives him, incidentally, much first-hand experience of social and domestic situations with which he might otherwise be out of touch. It also gives necessary insight into administration and into the situations confronting social workers.

THE SCHOOL

On a broad view, many of the problems encountered by school medical officers come within the scope of preventive mental-health work. Difficulties in school are often a source of personality maladjustment, or conversely may be symptoms of it. Problems of this type are normally catered for by a child-guidance service, though not all such children may require psychiatric treatment. In Oldham the psychologist to the health department is also psychologist to the child-guidance clinic, and his association with this clinic and with the schools allows of close liaison in cases where the emotional element is predominant. At the child-guidance clinic he carries out the normal functions of a psychologist in such a clinic, under psychiatric direction, and in coöperation with a psychiatric social worker. His duties involve psychological testing, observation of children in the clinic, school visiting, and the occasional interviewing of parents.

An example of the kind of school problem referred to him by school medical officers is that of the child with a specific reading disability. The question may arise whether the child is in need of special class tuition, individual remedial coaching, or admission to a special school; and, though the decision rests with the school medical officer, a detailed examination of the causes, which may be several and complex, is needed as a first step. Besides study of the background history, of adverse attitudes to learning or to school, and of emotional difficulties, selected tests should be carefully applied in every case. Many of these are tests of the various constituent skills which are basic to reading, and they cannot be properly applied and interpreted except by a trained psychologist.

HOSPITAL

The bulk of the psychologist's work at the hospital is diagnostic testing of patients referred by the consultant psychiatrist. The problems here range from straightforward intellectual assessments to complex investigations of personality deviations by means of projective techniques. Intellectual deterioration and vocational aptitudes may have to be estimated; and group testing of patients, and some group therapy, are also undertaken.

CONCLUSION

A psychologist employed in a public-health department has a definite contribution to make to a community mental-health service which aims at being comprehensive. This is so because mental-health work—whether in hospital, clinic, or community—is team-work, requiring the joint efforts of the various people engaged but requiring also some division of responsibilities for the use of their various skills. These principles will need to be put into practice by any local health authority intending to take on new commitments and to provide an efficient service in the care of mental health.

MEAT PIES

ABOUT two-thirds of the outbreaks of food-poisoning in England and Wales are due to eating "made-up" meat—i.e., sausages, saveloys, meat pies, and a host of similar eatables some of which have a merely local distribution and nomenclature.[1 2] Members of the genus Salmonella are responsible for about a quarter of these, but there is always some doubt whether the organisms are contained in the raw materials or are added by those who prepare them. German work in the early part of the century emphasised the danger of the cow, horse, or pig naturally infected with salmonella. We know that such infections occur in this country, though their frequency can only be guessed; and it is pretty certain that some infected meat and offal is likely to slip through a system of meat-inspection which makes almost no use of bacteriology. There is, in fact, little recent information about the number of infected animals in the slaughter-houses. 51% of pigs reaching slaughter-houses in Florida were found to harbour species of salmonella,[3] but we are told that in other parts of the United States the figure is less horrifying. Ludlam's observation that at times 40% of the rats in a factory processing the inedible residues of the meat trade carried these organisms gives reason to encourage similar observations here.[4]

If salmonellosis in man is uncommon (in comparison with influenza or ringworm) it may well be due to our national distaste for raw or undercooked meat. Nevertheless an exhaustive report on a serious outbreak of food-poisoning in Lancashire suggests that the danger may be nearer to hand than we recognise.[5] Over a thousand people were infected of whom 5 died. Many had eaten meat pies made by a reputable baker. *S. bovis-morbificans* was found in the fæces of most but not all the sufferers and in a large proportion of the pies. Not all those affected had eaten the pies. Some who had eaten pie and showed symptoms of infection never yielded any species of salmonella and a few yielded species other than *S. bovis-morbificans*. Many of those affected could give no clear picture of what they had or had not eaten. In short the investigators met most of the difficulties and red-herrings which are inseparable from these inquiries, but it was clear that the connection between pie and salmonella had to be unravelled. One of those who made the pies had a sharp attack of diarrhœa, but she was thought to be a victim rather than the origin of the accident. Gelatin was, as usual, a constituent of the pies, and gelatin is dangerous stuff because of its origin and because in the trade it is usually held at a temperature suitable for bacterial multiplication. In this instance it seems to have been innocent of blame. The meat was a mixed lot which included some veal described as having an "off and hammy" taint, and minced meat which had been kept eight days before delivery to the baker. Which, if either, of these was infected was never discovered though by unusual fortune it was possible to trace the herd from which the carcasses came. No direct evidence of infection in this herd could be found and the serological evidence is not easy to appraise. Whatever the source of infection it might have caused no damage if the usual baking practice had been followed. 380°F for four hours appears to be lethal to salmonella in a 4-oz. pie. On the fatal day (and probably not infrequently) this temperature was not reached in the oven for any considerable length of time, mostly because the oven door was opened to add more pies or cakes to its load. Extensive experiments showed that the temperature and time quoted are fairly near the critical ones for safety, though it is true that the strain of *S. bovis-morbificans* had a thermal death time as long as 20–22 minutes at 80°C. The baker's choice must lie between damage to his pies or his customers.

This report deserves to be read throughout. It is a reasonable guess that such accidents are rare; for infected meat and inefficient baking are both uncommon and the coincidence of the two operative factors is most exceptional. More scientific meat-inspection and better storage may do something to reduce the one danger and more conscientious baking the other. Absolute prevention demands a system of regulating trade practices to which nobody is likely to be agreeable. "Education" has for many years been a blessed word by which it was hoped to correct the failings of others: the recent campaigns for food hygiene suggest that it has its limitations. It is "the public" who suffer by these accidents and it may be that their best protection lies in a weapon which is seldom used. It was the heavy damages given against a reputable firm, for the fatal results of a picnic, that led to the manufacture of "potted meat" being made as free from risk as is humanly possible.

1. *Mon. Bull. Minist. Hlth. Lab. Serv.* 1955, **14**, 34.
2. Report of Working Party on Manufactured Meat Products. H.M. Stationery Office, 1950.
3. Galton, M. M., Smith, W. V., McElrath, H. B., Hardy, A. B. *J. infect. Dis.* 1954, **95**, 236.
4. Ludlam, G. B. *Mon. Bull. Minist. Hlth. Lab. Serv.* 1954, **13**, 196.
5. Ministry of Health. Reports on Public Health and Medical Subjects: no. 96. H.M. Stationery Office. 1955.

POLIOMYELITIS VACCINATION

AT a luncheon of the National Fund for Poliomyelitis Research on July 15, Dr. G. S. Wilson, director of the Public Health Laboratory Service, spoke of the present situation in poliomyelitis vaccination. He recalled that in 1935 a vaccine was prepared in the United States from a suspension of infected spinal cord treated with formaldehyde. The resultant vaccine protected laboratory animals, but when it was tried in man, poliomyelitis developed in a proportion of those inoculated and further use of the vaccine was forbidden.

When the results of the recent trials in the United States were announced they were regarded as a triumphant success, but, Dr. Wilson went on, some of the drawbacks of the vaccine had been glossed over. To those who had studied the problem of disinfection, the sequel caused little surprise. The zone of safety between danger on the one hand and ineffectiveness on the other was not wide. Despite the use of a comparatively pure suspension of virus, the Salk vaccine contained a good deal of foreign matter derived from the culture tissues, and it was difficult to ensure that every particle of virus was acted upon by a concentration of formaldehyde necessary to kill it. Dr. Wilson thought this was one of the fundamental difficulties of the killed vaccine. In the laboratory the vaccine appeared to be safe and yet, just as with the vaccine twenty years ago, it was found to be dangerous in the field. Further purification of the virus-suspension might improve matters, but the procedure could never be devoid of some risk. This was one reason, Dr. Wilson said, why many virologists believed that the future lay not with killed vaccine but with attenuated virus.

The use of the Salk vaccine had now been thrown right back to the experimental stage—into the melting-pot, in fact, Dr. Wilson added. Experiments were in progress to find a safer vaccine incorporating less virulent strains of vaccine. It was hoped to establish a unit at Fajara in the Gambia where there was reason to believe that strains of low virulence might be found. As soon as a new vaccine was available, a field trial of its accuracy would doubtless be undertaken, but not until the Medical Research Council's committees were completely satisfied of its safety.

A Ministry of Health statement on July 16 said that Government policy still rested on what the Minister had said in the Commons. So far it had been found best to abandon the idea of using the original form of the Salk vaccine, but modifications of it were certainly still the subject of research.

If I Were. . . .

IF I WERE DIRECTOR-GENERAL OF UNICEF *

CICELY D. WILLIAMS
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FORMERLY ADVISER IN MATERNITY AND CHILD HEALTH, SOUTH EAST ASIA REGION, WORLD HEALTH ORGANISATION

ALL the world over, but especially in the developing countries, the disorders of children are more often due to the ignorance and fatalism of their parents than to disease.

One of the chief difficulties of Western administrators and doctors is that the countries from which they come have a high regard for specialists. In these countries it is often felt that the more highly specialised the worker, the better the service he gives. Now the specialist may have a profound knowledge of his own specialty, but he usually takes for granted the setting in which it has functioned. It is unreasonable to expect that his advice will be equally efficacious in a setting totally different from that in which he gained his experience.

A specialist in *x* disease, or in *y* engineering, who goes to a new country will find many cases of *x*, or deficiencies in *y*. But he will not be able to judge how important these are in the economy of the new country unless he is helped by someone with wide local knowledge as well as a critical knowledge of what treatment for *x* or equipment for *y*, can achieve. This local adviser takes longer to gain his experience than a professional worker to acquire his training in some narrow specialty.

In the past there have been disappointments when Western machines and labour-saving devices have been applied to agriculture and engineering in developing countries—largely because they have been introduced without regard to the new background, human and environmental. The same is true of other programmes. It is usually necessary to "get acquainted" before health and welfare projects can be implemented. Material supplies are only a small part of the equipment needed; knowledge, understanding, and experience are necessary if a project is to succeed.

UNICEF is "The Children's Fund." Its main object, therefore, is to concentrate on the care and well-being of children. But it is not always easy to adjust the declared policy of UNICEF, as set out in its *Compendium*, with its "emphasis on mass impact and far-reaching effects," [1] to the great and imperfectly comprehended needs of the children.

The same document declares that "UNICEF aid is primarily in the form of supplies and equipment not available within the country." It seems unfortunate that this policy of "supplies and equipment" should be propounded before the needs of children have been investigated, and before the people to use them have been found. It may be that there are other ways in which help might be necessary and welcome, in which "supplies and equipment" would play a minor rôle.

The same document also says: "Other (United Nations) agencies supply technical or expert personnel who may be required to operate the programs until people within the country can be trained to take them over." But the people of the country cannot always be trained within a mere year or two. Some of the programmes have been started, or approved, by other agencies before they have been financed by UNICEF. But UNICEF has a large budget. Its income in 1953 was $16 million. The other United Nations agencies have comparatively small budgets—the World Health Organisation, for instance, has only about half this amount—and it is difficult for an agency with a low budget and a small staff to give the professional and technical supervision needed to make UNICEF-financed projects effective.

These agencies have many other responsibilities besides child care. The maternal and child-health section is only a small part of W.H.O. In practice "equipment and supplies" may not always be used to the best advantage because of this overpowering emphasis on material aids and mass impact, when, as many people who have worked in these areas would agree, the real needs are for understanding, education, and training.

UNICEF reckons to supply "the initial impetus to programs which assisted countries will eventually carry out themselves." Now an initial impetus is just what is needed for a vehicle that already has an efficient engine and a fuel supply. But it is not enough to turn the starting-handle when the machine scarcely exists and there is hardly any fuel. Nor does "mass impact" build machines; indeed it may not even supply much fuel.

There are especial difficulties in promoting programmes in child health. It is obvious that they need workers of the highest calibre and of wide experience. But in most of the more advanced countries child health is tragically divided between pædiatricians, with mainly hospital experience, and medical officers of the maternal and child-health departments with public-health experience. In contrast with experts in forestry, agriculture, mining, and fisheries, few pædiatricians have any wide or deep experience outside their own countries. Tropical medicine is mainly concerned with insect-borne diseases and tropical pædiatrics scarcely exists.

There is enough ill health among children in the developing countries to make good use of UNICEF funds even if they were much greater than they are. In some countries the infant mortality is ten times, and the toddler mortality forty times, greater than in the more advanced communities. It may be fairly simple to reckon the working days lost by adults with this or that disease, but at present it is impossible to compute the physical, emotional, and economic waste caused by a high infant and child mortality and morbidity.

To start, implement, supervise, and evaluate programmes in child health it would be necessary to train and employ a large staff of pædiatricians experienced in organisation and in tropical conditions. But W.H.O. has not the funds to do this. There are one, or possibly two, medical officers in the maternal and child health section at headquarters in Geneva, and one adviser at five of the six regional offices. The nutrition section of W.H.O., which is largely concerned with the nutritional needs of children, has one medical officer. These doctors are seriously overworked, and yet together they have accomplished a great deal. The staff employed on field projects are generally on short-term appointments of two to four years; so it is not easy to build up a cadre of experienced workers. Of course there is close collaboration with other sections such as mental health and health education, and most particularly, nursing.

The nutrition section of the Food and Agriculture Organisation, on the other hand, has seventeen scientific nutritionists. If it were appreciated that the human and medical aspects of nutrition are as important as the

* Mr. S. M. Keeny's article entitled If I were a Minister of Health in Asia (*Lancet*, July 2, 1955, p. 30) must have been read with the greatest interest in many countries. I earnestly hope that some of the ministers of health will also put their point of view. Having worked in child health in developing countries for nearly thirty years I have ventured to record some of my own reactions.
—C. D. W.

1. UNICEF Compendium, 1954–56, vol. 4, p. 4.

scientific, then the child-health specialists and the medical nutritionists would surely be increased.

The valuable work done by social anthropologists, agriculturists, scientific nutritionists, psychologists, health educators, social workers, and others could be used more satisfactorily to further child health if it were coördinated by specialists in child health. As it is, there is a tendency to concentrate on details of nutritional diseases rather than on treatment and prevention. There is more accumulated information on the biochemistry of liver cells than there is on the basic causes of malnutrition. Not only do we fail to see the wood for the trees, but international conferences are engrossed with the xylem and phloem of one or two particular trees and tend to disregard the vast forests and the soil they grow on.

Sane and balanced advice is all the more necessary because some developing countries feel that to ask for complex machinery, whether it is useful or not, is a sign of progress. In this way effort and money may be wasted.

Sound nutrition cannot be built on scientific findings alone. There must be hospitals, clinics, and health centres to teach people to apply them. Supplies and equipment for these institutions are effective only if there are trained doctors and nurses to use them. Training and demonstration programmes are valuable only if they are continuous and are adapted to local needs. Continuity and effectiveness can be achieved only if the international staff that coöperates in these programmes is adequate—in calibre, experience, and numbers—to assess the significance of child-health problems. Some of the delays and disappointments so far may well have been due to lack of personnel to advise the donor and recipient countries how to choose and use the right kind of help.

If I were director-general of UNICEF I should tackle the situation somewhat as follows:

1. I should make a clear distinction between emergency and other programmes.

2. I should abandon the policy of "mass impact" and "supplies and equipment" and concentrate on "far-reaching effects." These may be slower, but in the long run are probably more valuable.

3. I should make certain that the needs of children in a particular country were investigated by experienced pædiatricians before projects were started.

4. I should not spend money collected for children on the control of general disease until the professional advisers were satisfied that this was the most constructive way in which money could be spent.

5. If I were asked by a minister of health to supply travelling dispensaries I should (like Mr. Keeny) ask my professional advisers to make certain that there were roads to carry them and personnel to operate them before complying.

6. I should use UNICEF funds to provide extra staff for W.H.O. and other specialised agencies that coöperate in programmes for child care. I should try to induce these agencies to build up a cadre of expert and experienced professional workers for loan to countries for advice, planning, implementation, and evaluation of projects.

7. I should enable specialised agencies such as W.H.O. to arrange programmes in maternal and child health that were sufficiently long-term and flexible to:

(*a*) Observe local needs and resources before starting operations.

(*b*) Give expatriate personnel an opportunity to get acquainted with these needs and resources and for training with more experienced workers.

(*c*) Give them time and opportunity to adapt their requirements in personnel, supplies, and equipment to the considered progress of the work, and to assess their own methods and achievements.

8. I should encourage the development of child-health programmes by conferences, lectures, and refresher courses and literature for administrators, for doctors, nurses, and other workers.

9. I should put the greatest emphasis on training of personnel at all levels and in all training-schools. I should encourage the establishment of institutes of child health, as UNICEF is already doing in France[2] and in Calcutta, rather than spend large sums on disease control and equipment. These institutes would investigate child-health problems and train personnel at all levels, as well as care for children in hospitals, clinics, and demonstration and research areas.

10. I should promote long-term (or longitudinal) surveys rather than short-term ones.

11. I should give special consideration to areas where the needs of children are great, but the governments have not enough money or personnel to provide a "matching" contribution.

12. Above all I should recognise, and try to get the world to recognise, that the health and well-being of children depends on the education and affection of their parents rather than on material assets.

Parliament

Drop in Consumption of Welfare Foods

INTRODUCING a Ministry of Health vote in the House of Commons on July 12, Mr. IAIN MACLEOD, Minister of Health, said that the welfare-food scheme for some time had provided milk and supplements to expectant and nursing mothers and children under five. The scheme was administered by the Ministry of Food and when the local food offices were closed new arrangements had to be made for distribution. The Government had invited local authorities to take on this work because they believed that it was on the whole a good thing to give an important function back to these authorities from whom so many functions had lately been taken. These authorities were already responsible to the Minister for so many aspects of the health of mothers and young children it seemed appropriate that they should also distribute and encourage the use of welfare foods. The Minister would be concerned with the definition of the beneficiaries, with the fixing of the quantities of welfare foods, with the determination of prices, and with the enforcement, if that was necessary, in the event of offences. It followed that if the Minister was to determine policy he should also be responsible for cost under this supplementary estimate.

The Government, Mr. Macleod continued, regarded welfare foods as an important part of the country's social services, and he was uneasy to find that, comparing July to December, 1954, with the same period in 1953, the consumption of National milk had fallen by 8%, cod-liver oil by 14%, orange juice by 13%, and vitamin tablets by 20%. The figures for the first quarter of the present year showed the same trend for dried milk and orange juice, but more cod-liver oil and vitamin tablets had been used. A few spot checks had been taken in different parts of the country and these trends seemed to be level throughout the country. Mr. Macleod suggested that these figures gave cause for thought but not necessarily for concern. It could not be assumed that a drop in the figures of National dried milk had any nutritional significance. It might merely mask a turn towards some of the popular proprietary brands. The demand for welfare orange juice was affected by the availability of fresh fruit and there were many other sources of vitamin D besides cod-liver oil. All the same, the drop was substantial and must be watched in the next few months.

He thought that the local authorities might help in this matter. Part of the drop might be due to the difference in the siting of the places where these foods

2. Cookson, J. S. *Lancet*, 1955, i, 666.

were available and the hours at which the new centres were open. What the Ministry were really concerned with was to be certain that the diets of these children and mothers, which might be deficient, were supplemented. Local health authorities, through their staff at clinics, their health visitors, and in many other ways were well placed to see that the strongest possible advice to take up the welfare foods was given to those who needed them.

Dentists' Remuneration

On a further vote, necessitated by the cancellation of the 10% cut in dentists' remuneration, Mr. Macleod explained that this increase was an interim measure to operate while a new scale was being worked out for the fees of the dental profession—a complicated affair. Under the new arrangement average dentists would receive, including the Exchequer superannuation contribution, about £2000 net. That compared with the general practitioner's average net income of rather more than £2200. But it was calculated that single-handed dentists working without assistants, in the 35–54 age-groups, would receive rather more than £2400 net so that the relativity between dentists and doctors in general practice had been kept well in mind in making these arrangements. In a full year the 10% restoration would cost £3½ million for England and Wales, plus, of course, an extra amount for Scotland.

Mr. ARTHUR BLENKINSOP was sorry that the opportunity had not been taken to review more thoroughly the payment of dentists. Many people took the view that the payment for individual services rendered was open to objection. He would have been glad if some investigation had been made to see whether it was possible to get on to a basis of sessional payment, or something of that kind, for at least the conservative type of treatment. He assumed that the Minister hoped that this restoration of the 10% cut would do something to arrest the rather alarming decline in the number of dentists. The Central Health Services Council had made it clear that there was an over-all shortage of about 8000 dentists. About 40% of the practising dentists were 55 years of age or over, and there would be a rapid decline in the numbers of dentists in the next few years. If a proper dental service was to be built up, a large number of new entrants must be recruited to the dental schools. It had been said that about 900 new dental students were needed each year, but at present they were getting only about 450 new entrants. It was of great importance that dentists should be given a better status in the hospitals.

Dr. BARNETT STROSS said that it was hoped that in twenty years there would be 20,000 practising dentists in this country: today there were about 9500. What was the difficulty about recruitment? There was a wonderful field for recruitment among women. Only 6 dentists out of every 100 were women both in the schools and in practice. He saw no reason why women should not be as good dentists as men; they might be even better.

Mr. JOHN BAIRD, speaking as a practising dentist, said that he did not believe that remuneration was the main reason for the present lack of dentists. He thought that the decline in recruitment was due to the vacillation of both political parties. Dentists did not know where they were from one day to another until a few years ago. Another reason was that dentists were bad publicists. They tried to tell the public that they were hard up. That was a lot of baloney, because they were doing very well. That type of propaganda had done the dental profession a lot of harm. Mr. Baird believed that openings for young people in the dental profession were now very attractive. The sooner that attractiveness was publicised, the better it would be for the dentists and the country as a whole.

QUESTION TIME

Lung Cancer

Mr. NORMAN DODDS asked the Minister of Health, in view of the increase in this country of deaths from cancer of the lungs revealed in the survey by the World Health Organisation, what action was being taken to deal with the situation.—Mr. MACLEOD replied: The facts about the rise in mortality from lung cancer are, of course, well known. Research into the causes continues and expands, and facilities for treatment are being improved. The value of early diagnosis is constantly emphasised and, where it has been shown that workers in certain industries are prone to lung cancer, preventive action is being taken.

Dr. BARNETT STROSS: Would it be reasonable to guess that the Minister has been advised that from time to time he should draw the attention of the public to the fact that there is a known association between heavy smoking and cancer of the lung? Does he not agree that we ought to look upon this matter as a method of preventing lung cancer rather than waiting until it is well established and cannot be cured easily?—Mr. MACLEOD: This matter has been considered only by a committee of the Central Health Services Council and not yet by the full council itself. There is an understanding, which I am sure is right, that I should not take action on the individual reports of committees until the council has had an opportunity to advise me. Mr. BERESFORD CRADDOCK: Is it not a fact that all the more recent research shows that there is no proof of any direct connection between lung cancer and smoking?—Mr. MACLEOD: That goes much too far.

Replying to further questions, Mr. MACLEOD said that the next meeting of the Central Health Services Council was due to take place in October. There were differing opinions on this matter.

Group-practice Loans

Replying to a question, Miss PATRICIA HORNSBY-SMITH, parliamentary secretary to the Ministry of Health, said that by the middle of July this year 160 applications for loans from the group-practice loans fund had been received. Of these, 61 applications had already been approved.

Use of Observation Wards

In reply to a question, Mr. MACLEOD said that certified patients admitted to mental hospitals during 1952 and 1953 totalled 20,297 and 20,579 respectively. Of these totals the proportions admitted following a period of observation in a general hospital were respectively 16·92% and 15·69%.

Dr. DONALD JOHNSON: Is the Minister not aware from his figures that the majority of the large number of those admissions are direct into mental hospitals and only a minority are through the intermediary mental observation ward, and is he not aware of the statement made by a number of prominent medical psychiatrists that, despite the warnings of the last Royal Commission, the certification of these people suffering from temporary delirium and their consequent detention in mental hospitals is still taking place?—Mr. MACLEOD: The figures given are for patients who spent an intermediate period in the mental observation wards of a general hospital. There are, of course, in addition a great many patients who spend a period in the observation wards of mental hospitals, which would put rather a different complexion on the figures. That is a proportion which I should like to see increased.

Mr. KENNETH ROBINSON: Does the Minister agree that there is considerable difference of professional opinion about the whole desirability of observation wards? Would the Minister look into this aspect of the problem and perhaps consider the setting up of a departmental committee of inquiry?—Mr. MACLEOD: There is a difference of opinion about almost everything in connection with this and almost every other matter in the health service and I cannot undertake to set up departmental committees into all of them.

Medical Rejections of National Service Recruits

Replying to a question, Sir WALTER MONCKTON said that some 47,000 men were found medically unfit for National Service in 1954; this was 19·5% of the total number of men examined.

Hospital Pay-beds

Replying to a question, Mr. MACLEOD said that the number of pay-beds expressed as a percentage of the total bed complement (excluding beds shut owing to lack of staff) was as follows:

	1950	*1951*	*1952*	*1953*	*1954*
Teaching hospitals ..	7·29	6·56	6·19	6·12	6·06
Non-teaching hospitals	1·10	1·02	0·99	0·97	0·96

Guillebaud Report

Replying to a question Mr. MACLEOD said that he understood that the Guillebaud report might be ready by the late autumn.

In England Now

A Running Commentary by Peripatetic Correspondents

THOSE who were uneasy about what the film *Doctor in the House* might do to doctor-patient relationships need have no worries about the sequel, *Doctor at Sea*, which had its première last week. True, a family doctor is seen leaving for "an important consultation" with a bag of golf clubs over his shoulder; and this (among other things) constrains his assistant, Dr. Simon Sparrow, of St. Swithin's, to run away to sea. But thereafter Simon (again played with skill by Mr. Dirk Bogarde) is so striking a model of professional rectitude and skill that the ship's crew present him with the traditional bird-in-cage to mark his graduation as a real ship's doctor. Even Mr. James Robertson Justice, as one of the most trying patients ever to command a British ship, cannot ruffle his good humour, and Simon rises coolly to a classical high-seas appendicectomy. But the presence on board of the delightful Mlle. Brigitte Bardot never quite compensates for the absence of Mr. Kenneth More—the splendid Grimsdyke of *Doctor in the House*. Dr. Richard Gordon must make sure his next book includes a part that Mr. More cannot resist.

* * *

Today Mrs. B, a newcomer to the district, brought Barry to the infant-welfare clinic for the first visit. An only child, a lively friendly boy of $4\frac{1}{2}$ years, he came bouncing into my room. It was soon obvious who was in control. Conversation on his health, development, and abilities was almost impossible because of his continuous interrupting chatter—which his mother stopped to answer so patiently and meekly—and his persistent scraping of a little chair across the floor.

"What shall I do about his screaming? He's so high-spirited!" Mrs. B asked. "He comes in from the garden into the house, and just screams and screams. He just *loves* noise! And another thing, is it important? Sometimes he bites his fingers—it's when he has nothing to do."

At this, Barry stood close to me, and said: "Listen." Arms by his sides, he took a big breath, closed his eyes, opened his mouth wide, and launched a powerful, ear-splitting scream. Even an assistant medical officer's patience has limits. It had been a very hot and busy afternoon. My reaction came like lightning: "Shut up! Now sit on that little chair and keep quiet" He did so without ado. Astonishment at such lack of appreciation of his masterpiece was obvious, but he showed no resentment. Mother smiled on him complacently. "There now see." Blessed silence followed for a short time. Mrs. B and I resumed our discussion, now able to hear each other for the first time. Suddenly he remembered something else mother had said about him. Jumping up and down, he cried: "Look, look, I bite my fingers, too." His eyes were dancing with mischief in response to the twinkle in mine. Mother rose, beaming proudly on her treasure. "There, dear, Doctor thinks you're ever such a nice little boy."

Outside, she confided to the health visitor: "Its been so helpful to be able to come and talk about his little ways with Doctor. I shall certainly come again soon. Mothercraft, Tuesdays at 3? No, I won't be able to come—you see, he wouldn't agree to that. He does love his television so."

* * *

This morning there was the same haze, making outlines of houses and trees indistinct, the same stillness, the same remoteness of sounds, as in the tropics. We might have suddenly been transported there, 2° off the Equator, where we had learnt to love the sun and laugh in its flaming face. We almost began to think it was time to dose the children with 'Paludrine.' But the dream was rudely shattered when we saw Mrs. Brown on her way to the bus, outwardly, at least, as fully clothed as usual, beads of perspiration streaming down her face. Perhaps one needs to have lived in the tropics to know how to enjoy this heat. The children were happy at last after the prolonged bondage of respectable clothing, which had given rise one wintry morning to that agonised remark from our small boy so lately home from the freedom of the African forests—"Daddy, where are my trousers to keep my braces on with?"

* * *

I was sitting on my anæsthetist's stool looking at the backs of the surgeons and their satellites, when the idea came to me of writing a monograph on Braces and their Relation to the Personality.

Those of the Great Surgeon have severe lines. Their grey colour is in keeping with his cold and ruthless determination.

The Not-So-Great Surgeon is a fussy little man with big fussy braces consisting of a conglomeration of wires and loops, like the springs of a mattress in miniature.

The large smooth braces of the E.N.T. man are in keeping with his large frame and smooth manner.

Those of the harassed Anæsthetic Registrar induce a fine element of suspense. How much longer can the one and only surviving button hang on to the threadbare and much-mended braces—particularly as its load is usually increased by being fastened to the diagonally opposite and twisted buttonhole.

What's that? The operation finished half an hour ago? Well, why couldn't you have told me sooner?

* * *

It may not be too late. We have seen the benefits of antibiotics and their after-effects in alimentary upsets, black tongues, and the emergence of resistant organisms. We hear on every side of bigger, better, and newer antibiotics with wider and yet wider spectra. But nobody has grasped the significant fact that what we really need is a *narrow-spectrum* antibiotic—the narrower the better. And until this is achieved we shall remain on the merry-go-round and end up like the »wonga-wonga bird.

* * *

The fruit-growers put glue around the trunks of their trees as a caterpillar-trap. My patient had a pimple on his wrist with the beginning of a red line and above it a brown steak all around the arm. He explained: "Oh, Doctor, that's to stop blood poisoning. You just paint iodine around the arm and the bugs won't travel upwards."

* * *

"Automation"
Is an abomination
Fit only for extermination.
I prefer the whatnotery
Godwot-ery
"Robot-ery."

* * *

When I landed in New York the presence of so many armed officials unnerved me and I was wearing a Harris tweed suit with the temperature at 90 and the humidity 90%!! I struggled nervously through the customs and was relieved to see a T-shirted Goliath approach to take my baggage through the barrier. He must have sized me up as yet another alien, for he grinned reassuringly and, as he swung my trunk onto his barrow, said, in a deep drawl, "You're goin' to like this country, bud—this is a *free* country."

His assertion of freedom in what seemed to me to be a veritable arsenal annoyed me, and as my irritation increased so my enunciation became crisper as I replied petulantly, "What do you mean 'free' country? I have just come from a free country and it is an older democracy than this!" The barrow stopped. Amazement spread over his face as he said, "Gee! You sure learned English quick!"

* * *

News from School.—"I have done nothing this week except making highly explosive chemicals, modelling clay into absurd shapes, finding latent heat of vaporisation of water, learning *ἀγγελλω*, *αἰσχυνομαι*, etc., and not playing cricket. Also possibly developing up to 40 negatives and printing them. However, last night there was a slight break in all this to allow two masters to give talks—one on Singapore, the other on Russia. Do I want a blazer? I have been offered an almost new one which fits me for a pound."

Letters to the Editor

MUSCLE IMBALANCE IN SCOLIOSIS

SIR,—A possible mechanism underlying idiopathic spinal scoliosis was postulated by Mr. Riddle and Mr. Roaf (June 18) as a result of their electromyographic studies. They found that the deep spinal muscles on the convex side of the scoliotic deformity contracted more strongly than on the opposite side, whereas the more superficial muscles either had the same strength on both sides of the deformity or were weaker at the convexity.

They merely hinted at the anatomical explanation of their findings. But this is easily seen in a few minutes of experiment with a disarticulated vertebral column, considering the precise origins and insertions of the deep back muscles.

The sacrospinalis group (iliocostalis, longissimus, and spinalis) have a longitudinal cranio-caudal orientation, and are extensors (and in the case of iliocostalis weak lateral flexors) of the vertebral column.

The deeper muscles (semispinalis, multifidus, and rotators) are directed medially, posteriorly, and cephalad. They arise from transverse processes or laminæ, and pass medially, backwards, and upwards to be inserted into the spinous processes of more cranially placed vertebræ. The deeper the muscle is placed the fewer vertebræ it spans.

The function of these deeper muscles is said in the standard textbooks to be a postural one. But these electromyographic studies confirm what may easily be deduced from a study of their bony attachments—that these deep muscles are in fact important rotators, and that when those of one side are paretic, the muscles of the opposite side, by virtue of their attachments, rotate the vertebræ into a scoliotic position (see accompanying figure).

Department of Anatomy,
Makerere College Medical School,
Kampala, Uganda. D. B. ALLBROOK.

GASTRIC ATROPHY PRECEDING PERNICIOUS ANÆMIA

SIR,—The most interesting observations of Dr. Robertson and his colleagues (July 9) establish that gastric atrophy may precede the appearance of the megaloblastic anæmia of addisonian pernicious anæmia. However, it has yet to be established that gastric atrophy invariably precedes the development of vitamin-B_{12} deficiency. For example, it is possible that their patient had vitamin-B_{12} deficiency for many years before the time of the first biopsy, for he had already been complaining of neurological symptoms for six years.

Patients in whom the neurological complications of vitamin-B_{12} deficiency develop before the onset of anæmia are as severely deficient in the vitamin as patients with pernicious anæmia in severe relapse.[1] Furthermore, there is evidence that the serum-vitamin-B_{12} concentrations may be low in patients for a considerable time before either the anæmia or the neurological complications appear.

There is little doubt that gastric atrophy and pernicious anæmia are inter-related, but until it is established that the gastric atrophy precedes the depression of intrinsic-factor secretion and the development of vitamin-B_{12} deficiency, the relation of the atrophy to the pathogenesis of pernicious anæmia will remain uncertain. The observation that addisonian pernicious anæmia may very occasionally occur without gastric atrophy [2] suggests that, in some instances at least, the atrophy is not the primary lesion in this condition.

Department of Hæmatology,
Postgraduate Medical School,
London, W.12. D. L. MOLLIN.

1. Mollin, D. L., Ross, G. I. M. *Proc. R. Soc. med.* 1954, **47**, 428.

GASTRECTOMY IN A HÆMOPHILIAC

SIR,—In your issue of April 9 Dr. Walker reported a successful gastrectomy in a hæmophiliac. This major operation, and indeed all operations on patients known to suffer from hæmorrhagic diathesis, are rarely performed except under very urgent circumstances. We wish to add another case of gastrectomy carried out in a hæmophiliac in whom bleeding remained confined to the stomach.

The patient was a man of 29. There was no family history of bleeding. As a child he had repeated epistaxis which stopped after nasal cauterisation. He bled from gums and had severe hæmorrhages after tooth extractions. There was persistent bleeding after minor cuts and he bruised easily. After the age of 14 his only source of bleeding was the stomach, in the form of hæmatemeses, melæna, or both.

We saw him for the first time in 1949 when he was given four pints of blood on account of hæmatemesis. Since then he has been admitted several times for a similar condition and altogether he has had twelve episodes of bleeding. The last one was in October, 1954, when he had to be given fourteen pints of blood (stored blood). There has never been any symptom of dyspepsia.

Investigations.—Barium meal, repeated three times, showed no abnormality. Gastroscopy, carried out three times in the last four years, showed patchy atrophic gastritis in the lower half of the stomach only. The fractional test-meal was normal. Red and white cells and platelets were normal. Hæmoglobin varied according to the severity of the hæmorrhage and was 28% on his last admission. Bleeding, clotting, and prothrombin-times, capillary fragility, and clot retraction were all normal on repeated occasions. Liver-function tests were normal.

We felt that the bleeding might be the result of recurrent acute erosions on his atrophic gastric mucosa but that, in view of his previous history, an abnormality of his blood could be responsible for the severity of the hæmorrhages.

We referred him to Dr. J. V. Dacie, who found that he undoubtedly had hæmophilia as confirmed by the prothrombin-consumption test and the thromboplastin-generation test.

Treatment.—Blood-transfusion was given on many occasions for his repeated bleeding. After his last admission he became extremely anxious about future attacks and he was all but demanding an operation, although the risks of it were fully discussed with him and his relatives. A two-third gastrectomy was carried out in January, 1955. The patient was given a pint of fresh blood, starting ½ hr. before operation and continuing during and after it. At operation there was no unusual bleeding. The patient was well for twenty-four hours, after which he bled from the stomach for six days; during this time he received ten pints of fresh blood. Then he stopped bleeding suddenly and made an uneventful recovery. Examination of the stomach after removal confirmed the gastroscopic findings—atrophic gastritis and no ulceration.

This patient's bleeding tendency had been confined to the stomach since the age of 14. It is well known that in a large proportion of patients with hæmorrhagic conditions the tendency to bleed decreases as they

2. Mollin, D. L., Baker, S. J., Doniach, I. *Brit. J. Hæmat.* 1955, **1**, 278.

approach adult life, except occasionally from some particular site which may be diseased, the treatment of which may stop the bleeding—e.g., epistaxis. In this case the repeated hæmatemeses were associated with gross atrophic gastritis.

Hæmophilia in this case was established only after the thromboplastin-generation and prothrombin-consumption tests. The need for these elaborate tests is especially important when absence of family history may weigh against a diagnosis of hæmophilia.

Despite its risks, a major operation in a hæmophiliac may have to be done when his life is endangered or disorganised by repeated bleeding. Generous transfusions with fresh blood before and during the operation is the only measure now available but it is our hope that the antihæmophilic globulin being prepared at the Radcliffe Infirmary, Oxford, may be made available to general hospitals and prove the best safeguard against post-operative bleeding.

St. Alfege's Hospital, London, S.E.10. M. G. ELDIN
E. T. BASSADONE.

STAFFING THE TRANSFUSION SERVICE

SIR,—Your annotation last week gives some idea of the difficulties of the transfusion service with regard to technical staffing, but these difficulties are only part of a greater problem of technical staffing of hospital and transfusion laboratories. There has been a considerable drain from these to industry over the past five years. The general salary-scale and prospects of technicians are unsatisfactory. It would appear that a recent offer by the management side does not offer for technicians any great advance on present scales or any advancement of prospects. My own opinion is that younger technicians have only stayed in the hospital and transfusion laboratory service in the hope that the forthcoming negotiations would give them pay and prospects materially better than those they have at the moment.

Unless the management side undergoes a change of heart and makes a more realistic offer, I think that hospital and transfusion laboratories throughout the country are going to suffer a further disastrous loss of trained and partly trained technicians which will make the present level of service impossible.

Group Pathological Laboratory, Lakin Road, Warwick. A. P. PRIOR.

ACUTE INFECTIVE POLYNEURITIS

SIR,—Dr. Allison and Dr. Gordon (July 16), in their introductory review of acute infective polyneuritis, attribute its first description to Guillain, Barré, and Strohl in 1916. It should be noted that, although we may now regard their two cases as falling into this group, these authors were under the impression that they were describing something quite different, which they called "polyradiculoneuritis." Guillain maintained this distinction at least until the symposium of 1938. He and his colleagues were the first to draw attention to the rise in cerebrospinal-fluid protein without increase in cells, which was later found in other forms of polyneuritis, such as that of diphtheria. An earlier account of the clinical features was that of Laurens.[1]

I question whether many now believe that a virus is responsible for this syndrome. In spite of much experimental work, no acceptable evidence of transmission of an infective agent has ever been obtained. In recent years the biochemical approach has appeared much more hopeful. There have also been reports of successful treatment based on the hypothesis that an altered tissue sensitivity causes the manifestations.

The ætiology is not only unknown, as your contributors observe, but may be various. Their demonstration of a "mechanical" cause in their report is of much interest, but to apply this interpretation to the generality of such patients, as your readers might be tempted to do, would be to ignore the post-mortem studies of many neuropathologists published during the last forty years.

1. Paris thesis no. 210; 1908.

London, W.1. C. P. PETCH.

LEUKÆMIA IN ANKYLOSING SPONDYLITIS TREATED WITH X RAYS

SIR,—I have read with great interest the article by Dr. Court Brown and Dr. Abbatt (June 25) concerning the incidence of leukæmia in ankylosing spondylitis treated with X rays. Their findings are obviously of extreme importance, but it would seem that a much more detailed investigation should be carried out before the rôle of irradiation in producing leukæmia in these cases can be assessed.

For instance, the authors state that the incidence of leukæmia is appreciably raised in patients given more than one course of X-ray treatment. There is, however, a wide variation between different radiotherapy centres both in the dosage given and in the volume irradiated in the treatment of this disease. Some centres give as much as 2500r in two weeks to the whole spine and sacro-iliac joints, while others give as little as 100r–150r a week for six to ten weeks, often limited to the part of the spine giving symptoms. It would be interesting to know: (1) whether the incidence of leukæmia varies directly with the X-ray dosage given and/or the volume irradiated, and, if so, what are the safe levels; (2) the incidence of leukæmia in untreated cases.

Radiotherapy Department, St. Thomas's Hospital, London, S.E.1. I. CHURCHILL-DAVIDSON.

TREATMENT OF STATUS EPILEPTICUS

SIR,—The recent admission to this hospital of a patient in status epilepticus who had failed to respond to the usual forms of treatment, and the admission of other cases of the same condition during the past nine years, prompts me to draw attention to a method of treatment which deserves to be more widely known. The only published reference of which I am aware[1] deals with its use in status epilepticus occurring as a complication of insulin-coma therapy. It is through the kindness of one of the authors of this article, Dr. S. W. Gillman, that I am recording the method anew.

The patient, a woman of 28, has been a known epileptic for four years, the diagnosis having been confirmed by an electroencephalogram in 1952. She has been in status epilepticus once before—in March, 1954. Her present attack began on May 8 and was initially controlled for a short time by intramuscular paraldehyde, but there was a recurrence on May 10 when she was admitted to this hospital as a temporary patient. On the morning of admission she had 16 grand-mal attacks. She was then given 5 ml. of a 10% solution of hexobarbitone sodium into each buttock. This controlled her fits for three hours, when a further two convulsions necessitated the injection of an additional 10 ml. This proved sufficient to establish control and she was then placed upon routine treatment with phenobarbitone and primidone.

Intramuscular hexobarbitone sodium in doses between 0·5 g. and 1 g. has been used successfully at this hospital in the treatment of every case of status epilepticus for at least nine years. It has proved more reliable than the intramuscular injection of paraldehyde or phenobarbitone. Furthermore, it is technically easier to give than intravenous barbiturates in a patient with clonic movements, and the need for an anæsthetic machine to give positive-pressure respiration does not arise. Although a 10% solution of hexobarbitone sodium is alkaline (pH 10·5), no local reactions have been found to occur if it is given deeply into the muscle.

I am grateful to Dr. E. S. Stern for permission to publish details of this case.

The Central Hospital, near Warwick. PETER J. WILLIAMSON.

1. Gillman, S. W., Parfitt, D. N. *J. ment. Sci.* 1938, **84**, 718.

THE MICRO-ENVIRONMENT OF INFLAMMATION

SIR,—I was greatly interested in Professor Dubos's lecture (July 2) which throws new light on the inflammatory process.

With reference to the important peptides which, as he states, may be derived through necrosis from "more complex organic structures (nucleoproteins, for example)," it is perhaps interesting to note that Simpson[1] has demonstrated the presence of fibrils of deoxyribonucleic acid in purulent exudates, their source being the eosinophil and neutrophil leucocyte. Since the amount of deoxyribonucleic acid in granulocytes appears to diminish with advancing years[2] and at the same time the resistance to infection is lowered, is it not possible that this "substance within the phagocytes" has among others an antimicrobial effect?

Tooting Bec Hospital,
London, S.W.17. NOEL ALDER.

POLIOMYELITIS AND TONSILLECTOMY

SIR,—I do not think enough attention has been paid to the most important aspect of this subject—namely, host immunity, both local and general. This may be indefinable, but it is now well appreciated that, in poliomyelitis, any trauma (e.g., injection and operation) may upset local tissue immunity so that subsequent signs may develop at that point.

Although criticism of tonsillectomy has been rising in recent years, relatively little thought has been given to the relationship of host immunity to it. Inevitably, therefore, the question of the operation itself must be considered.

Among the numerous useless indications, in my view, is that of repeated general infections—respiratory, exanthemata, and so forth. It is illogical to expect that the operation will prevent or minimise their occurrence, which is largely a question of general host immunity. It should, therefore, be unnecessary to repeat what is well known—namely, that, in children at any rate, the lymphoreticular system is the most active defence against infection. The removal of a part of it (the tonsils) in the pious hope of bolstering immunity, is as effective as the removal of a *sound* link of mooring-chain in preventing or minimising a ship's movement.

Long tonsillectomy lists would be shortened and any upset of the immune reaction, such as in poliomyelitis, minimised, if the indications for operation were confined to the only *two* logical ones—gross chronic infection of the organs themselves and/or gross obstruction to the nose and ears by them or other nasopharyngeal lymphoid aggregations.

Ilford Isolation Hospital,
Essex. I. M. LIBRACH.

OBSERVER ERROR

SIR,—Dr. Stradling and Dr. Johnston (June 18), reporting on a series of 1000 cases referred by general practitioners and examined radiographically on 70 mm. films, deduce from their findings that two films should be taken of each patient, and that every film should be examined by two observers.

From our own experience we would support their case for two films, though whether the lordotic is the best choice for the second film is debatable; but we wonder where their claim for a second observer may lead us.

In any field of medicine a case could be made out for observer error. Why not have two G.P.s examine patients at all surgeries, or two consultants check each other's findings in outpatients? If this contention were accepted even in the mass-radiography field alone, every unit would require two medical officers!

We know that observer error exists, and in practice it must be countered to the best of one's ability. Surely we must remember that the main reason for miniature radiography is economy. If we do not want the financial burden of recalling nearly 40% of cases examined on miniature film, and of doubling the medical staff, then we consider that the four following points are a practical alternative:

(1) Employ a competent technician who will ensure that the films are of the highest quality.

(2) Take two films of every patient, as the increased cost is more than repaid by the reduction in recalls.

(3) Have the films read by an experienced observer who is interested in the work.

(4) Arrange for periodic checks of the observer's accuracy.

X-ray Department,
Churchill Hospital, Oxford. J. L. BOLDERO
K. LUMSDEN.

LUNG CANCER AND SMOKING

SIR,—No plant virus has so far been found that can infect a mammal although some can infect insects. It is therefore unlikely that tobacco mosaic virus could be a cause of lung cancer, as Mr. Goodman suggests (July 16). So much for theory. In practice some thousands of rabbits, guineapigs, and mice have by now been injected with tobacco mosaic virus by various routes and there have been no reports of effects other than exuberant antibody formation.

Theory and animal experiments seem to agree so we can turn to what is known about man. There have been few deliberate experiments but if exposure to tobacco mosaic virus were a cause of lung cancer the incidence would presumably be affected by the intensity of exposure. I have been splashing the virus about in a casual large-scale chemical way almost every day for more than 20 years and I and my associates must have absorbed much more of it through various orifices than any smoker would in the course of smoking. So far our lungs seem to be normal. If mine finally develop cancer it will be very significant because all I smoke is an occasional cigar.

Rothamsted Experimental Station,
Harpenden, Herts. N. W. PIRIE.

TREACLE FOR CONSTIPATION

SIR,—Mr. Allen's wholly delightful literary riposte (July 16) has illuminated the thick black darkness of treacle treatment besides revealing a pharmacological error in my letter of July 2. I am indebted to him for calling my attention to my *lapsus calami*, albeit by a somewhat circuitous route.

My letter was essentially practical and the allusion to acetylcholine was in the nature of an *obiter dictum*. I did not in fact "suggest" anything—as Mr. Allen, in the best legal tradition, suggests I did. The phrase I used, "is said to," implies hearsay, unverified, or doubtful evidence. However, that does not explain the inaccuracy which he rightly points out and to make the necessary correction I must refer briefly to the history of my interest in the treacle for constipation. This dates from reading the best paper on the postoperative management of the abdominal case I have ever come across.[1] Here the value of the treacle enema is mentioned and its effectiveness attributed to the choline content. Acetylcholine is, of course, highly unstable. My letter should, therefore, have read "said to contain choline."

I must confess I have not sought to analyse treacle beyond this point but have contented myself with its virtues. And here we are in good company since Chaucer himself with all his down-to-earth wisdom had an eye for its therapeutic usefulness when he said "I almost caught a cardynacle by corpus bones, but (unless) I have a triacle, or elles a draughte of moyste and corny ale mine herte is lost." Ale also contains choline but nevertheless if Mr. Allen pursues his bibliographical

1. Simpson, R. E. H. *Lancet*, 1951, i, 110.
2. Alder, N. *Ibid*, 1951, ii, 293.

1. Lawrence Abel, A. *Postgrad. med. J.* 1937, **13**, 435.

researches, I fear that he might find treacle, which as Theriac from Mithridates (124–64 B.C.) is the bed rock of his art, contains nothing at all but stickiness. Perhaps that is the sole reason why it works so well.

London, W.1. D. LANG STEVENSON.

MERRYGOWHIMBLES

SIR,—Perhaps someone can tell us something of the origin of this word (Widdicombe File, June 11). Presumably it must not be confused with the billy-go-nimbles, which the *English Dialect Dictionary* tells us is an imaginary disease and apparently largely confined to South Cheshire, where at one time it formed a picturesque triad with the pimple-pamples and pompitation o' the heart.

The Radcliffe Infirmary, Oxford. JOHN POTTER.

VITAMIN B_{12} IN URÆMIA

SIR,—After reading Professor Bull's interesting article (April 9 and 16), I would like to say that I have tried vitamin B_{12} in 3 uræmic patients who had anorexia, nausea, lethargy, heaviness of the head, and vertigo. 200 μg. of vitamin B_{12} was injected intramuscularly every other day (800–1000 μg. in all).

After two or three days, there was considerable improvement of appetite, followed by reduction of nausea, lethargy, heaviness of the head, and vertigo. All 3 patients felt much better. This improvement lasted for about three or four weeks after stopping the vitamin B_{12}.

It seems to me that vitamin B_{12} may have a place in the symptomatic management of uræmic states.

Midnipur, India. DEBABRATA PAL.

CLINICAL TESTS OF PASSIVE JOINT SENSE

SIR,—We are grateful for last week's observations by Sir Charles Symonds and Dr. William Gooddy on our paper (July 9). In the case of Sir Charles Symonds's comments, there is less disparity between his method of testing passive joint sense and ours than would at first appear. The basic procedure is the same except that we provided for constant rotation by using a machine. We did in fact consider carefully the question of rotational speed, and in preliminary trials used speeds of 0·2°, 1°, and 2° per sec., finding little difference in the average angle traversed before movement was appreciated. However, we subsequently abandoned the slowest speed because of the difficulty sometimes experienced in deciding on the exact moment at which sensation of movement was first experienced with certainty.[1]

In using these speeds we were aware of the statement of Sir Gordon Holmes that "since rapid and abrupt displacements are most easily perceived, passive movements should always be carried out slowly and at a uniform rate."[2] In view of this, and the fact that no significant difference in the minimum angle perceived was found between the two speeds of 1° and 2° per sec., the investigation did not include the examination of the effects of higher speeds of rotation. Also we were doubtful about the reliability of determinations at higher speeds of rotation, at which the reaction-time of the subject might be undesirably long in relation to the duration of the movement.

These conditions would be realised with the speed of rotation used by Dr. Gooddy, in which the anatomical limit of movement of the toe would be reached in one second. However, we are grateful for the description of his test as it raises the basic issue of our article. If the test is carried out as he describes it, then other sensations beside passive joint sense may be evoked, and it is possible that only patients with lesions in the posterior columns of the cord would fail such a test. But we maintain our view that if the test is carried out in such a way as to evoke only passive joint sense at the metatarso-phalangeal joint, it is unreliable; where satisfactory results are obtained in clinical practice, this is because it is not solely passive joint sense that is being tested.

J. LEE
London, W.C.2. K. BROWNE.

SIR,—It is unfortunate that tests of passive joint sense are still a subject of controversy. It has been shown[1] that tests of sense of skin movement are superior and that one of these called "the discrimination between pinching and pressing of the skin" is probably best of all. It was suggested that tests of joint sense should be discarded from clinical practice.

It is not generally realised that any test involving the element of space—that is, space external to the body—reveals a disturbance of the posterior-column/parietal-lobe system. It is actually the sense of space that is being tested and one is at liberty to choose the most sensitive tests of this function. Two-point discrimination is the most sensitive but unfortunately tends to be unreliable.

There is such a large number of tests involving the element of space that there is need of a term to cover a loss of sense of space. I have thought of introducing the terms dyschoræsthesia and achorognosia. Dyschoræsthesia and paralysis, and achorognosia and apraxia would thus be complementary terms.

Glasgow. S. RENFREW.

THE BOMBS

SIR,—As a member of the international medical commission which visited Japan to investigate the medical and biological effects of atom-bomb and experimental hydrogen-bomb explosions,* I should like (1) to draw attention to new evidence given to us about the genetic effects of the A-bombs at Nagasaki and Hiroshima in 1945, and (2) to outline the evidence given to us about the radioactive contamination of a vast area of the globe persisting for months after the experimental H-bomb explosions at Bikini in 1954.

Genetic Effects of the A-bomb

Professor Hayashi, of the Nagasaki Medical School, told us that he had performed necropsies on 887 neonatal infants born in Nagasaki during $4^1/_2$ years from 1949 to 1953. He divided these infants into two groups and compared the incidence of *major* congenital malformations among those whose parents (one or both) were exposed to the A-bomb with the incidence among those whose parents were not so exposed. Only major anomalies were considered and common abnormalities such as "accessory spleens, abnormal lung lobation, &c.," were excluded. Parents were regarded as having been exposed to the A-bomb if, when the explosion took place, they were living within 10 km. of its centre. Table I shows an incidence of 18·9% major congenital malformations among the infants of parents one or both of whom were exposed to the A-bomb, compared with 11% among infants neither of whose parents were exposed. In other words, the frequency of such malformations was increased by 72%. Related to this finding is that of Macht and Lawrence[2] who found that congenital malformations were 24% higher among the children of radiologists than among the children of other doctors. Table II shows that

1. Browne, K., Lee, J., Ring, P. A. *J. Physiol.* 1954, **126**, 448.
2. Introduction to Clinical Neurology. London, 1952; p. 94.

* A report of the preliminary conclusions of the commission appears on p. 187.—ED. L.

1. Renfrew, S., Cavanagh, D. *Brain*, 1954, **77**, 305.
2. Macht, S. H., Lawrence, P. S. *Amer. J. Roentgenol.* 1955, **73**, 442.

TABLE I—CONGENITAL ABNORMALITIES IN RELATION TO EXPOSURE OF PARENTS

—	No. of infants	No. malformed	% malformed
One or both parents exposed to A-bomb	497*	92	18·9
Both parents exposed	149	27	18·1
Father exposed, mother not	80	18	22·5
Mother exposed, father not	259	47	18·1
Neither parent exposed	363	40	11·0
Both parents unknown or exposure information not available	27	10	..

* Includes 9 children "mother exposed, father unknown."

in Nagasaki the congenital defects which particularly increased were those of the cardiovascular, central nervous, and genito-urinary systems, although the incidence of bone and muscle defects was also higher. Hayashi stated that certain malformations, like "meningeal cyst, atresia ani, &c.," were found only in the exposed group, while others ("complicated cardiovascular anomalies and diaphragmatic hernia") were much commoner. He said, moreover, that for each of the 4 years the incidence of congenital abnormalities was higher in the exposed group. This strengthens the general conclusion that major congenital abnormalities were more frequent among the children of

TABLE II—MALFORMATION OF VARIOUS BODY SYSTEMS IN RELATION TO EXPOSURE OF PARENTS

—	No. of infants	Abnormalities of				
		Bone and muscle	Cardio-vascular system	Central nervous system	Genito-urinary tract	Respiratory tract
Parent(s) exposed	497	39 (8%)	34 (6·8%)	26 (5·2%)	19 (3·8%)	4 (0·8%)
Parents not exposed	363	25 (7%)	18 (5%)	13 (3·6%)	8 (2·2%)	1 (0·27%)

parents who had been exposed to the A-bomb 4–8 years previously, and that this greater frequency is probably continuing.

As Hayashi did not give the total number of births of infants from which his material was obtained, his results might be explained in one of three ways.

1. Exposure of the parent(s) to radiation had reduced the number of infant deaths from other causes and had left the number of malformations unaltered, thus producing a relative increase in the incidence of malformations. This seems far-fetched.

2. Other causes of infantile death were unaltered and the incidence of malformations had increased by over 70%.

3. Other causes of death increased the death-rate by, say, about 20–30%, while malformations went up by 100%.

In my opinion either the second or third explanation is the correct one. Theoretically the most probable explanation for Hayashi's findings is that lethal genetic changes (including chromosome rearrangements in current genetic theory) occurred in the sex organs in many of those who were exposed at Nagasaki. The other possibility is that unfavourable intra-uterine environment, due to exposure of the mother, was responsible; but this is unlikely, since the incidence of 22·5% of malformations among the 80 "father exposed, mother not" group, does not support this. Supplementary evidence of genetic effects due to exposure to radiation at Nagasaki has been found by Neel et al., of the Atomic Bomb Casualty Commission.[3] These workers found significant changes in the male/female ratios among the children of exposed parents. For example male children were less numerous among the offspring of women exposed to radiation, and this is said to be the result of sex-linked recessive lethal mutations. The sex-incidence of Hayashi's malformed infants should be of interest.

3. *Science*, 1953, **118**, 537.

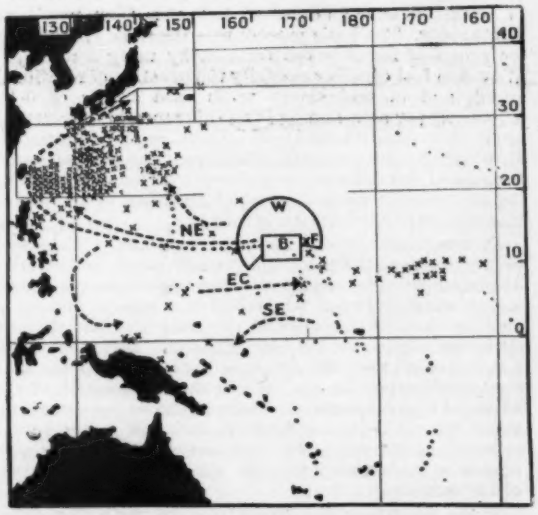
Experimental H-bomb Explosions [4–10]

Perhaps even more important to the future of mankind than the terrible A-bombs in Japan have been the effects of the experimental H-bomb explosions at Bikini, the first of which took place in March, 1954. The experience of the ill-fated fishing-boat, *Fukuryu Maru*, which was heavily showered with radioactive dust for 4 hours whilst steaming 80–100 miles outside the "calculated danger zone" was merely an incident in the radioactive contamination of the Pacific Ocean and of the atmosphere.

Radioactive rain fell all over Japan for months, particularly along the Pacific Coast and in the southern and central areas. In May the radioactivity varied from 0·1 to 1·0 μC per litre. This was associated with contamination of the atmosphere by radioactive dust which was falling to the ground and contaminating the soil. Radiochemical analysis of the rain at different institutions has shown that the radioactivity was due to a mixture of fission products similar to those detected in the Bikini ash collected from the deck of the *Fukuryu Maru*. The elements detected in the rain include ^{140}Ba, ^{140}La, ^{131}I, ^{132}I, ^{95}Zr, ^{95}Nb, ^{89}St, ^{129}Te, ^{237}U, and a group of rare-earth elements. Similar artificial radioactivity was found on the surface of the soil and on vegetables.

In various parts of Japan radioactive rain and dust resulted in the contamination of many kinds of crops,

4. Report on the Contamination by A and H bombs, by the Japanese preparatory committee of the Conference of Asian Nations, Tokyo, March, 1955.
5. Miyake, Y. Papers in *Meteorology and Geophysics*, 1954, **5**, 2; also special report to the international commission, 1955.
6. Nishiwaki, Y. Special report to the international commission, 1955.
7. Kimura, K., et al. *Japan Analyst*, August, 1954.
8. Arizumi, N. *J. met. Soc. Japan*, 1954, **32**, 9.
9. Egawa, T., Iimura, K., Shirai, T., Yoshida, T., Kawarazaki, B., Kono, M., Tsukahara, S. *Soil and Plant Food*, 1955, **1**, 19.
10. *Asahi*, Jan. 22, 1955.



Map showing points (×) where contaminated fish were caught or where the sea was found to be excessively radioactive (*by kind permission of Y. Nishiwaki, somewhat simplified*).

B = original "danger zone" around Bikini announced by the U.S. government.
xF = position of the *Fukuryu Maru*.
W (quadrant) = "danger zone" extended later.
NE, EC, SE are equatorial currents.

all or most of which have been freely sold in the markets. Crop contamination was not only due to surface contamination of the leaves but also to absorption of radioactivity through the roots. In this way barley, wheat, rice, vegetables, and tea were contaminated—all the main crops in Japan. The degree of radioactivity was not high, but there was a definite or considerable excess of radioactivity in the tea, barley, rice, and wheat as compared with the 1952 and 1953 crops.[4,9] In many places the rice crop, for example, was found to be 10–20 times more radioactive than in the preceding years. Most of the radioactivity in the tea was water-soluble, and it was estimated that the drinking of three cups of tea daily gave a dose of radioactivity in excess of the so-called "maximum permissive dose" laid down by the U.S. Bureau of Standards.

Radioactive contamination of the fish caught in Japanese waters and in other parts of the Pacific led to a government inspection of all fish landed at Japanese ports. Fish with a surface radioactivity of over 100 counts per minute at 10 cm. distance (normal background-count was 20) were condemned. This affected about 6% of all catches and about a million pounds of fish. Other fish with excessive surface-counts between 20 and 100 per minute were sent to market and eaten by the Japanese people. The tuna and bonito fishing organisations claimed that the total loss to the fishing industry amounted to $6 million.[10] For various reasons the government discontinued the inspection last December; but even at that time occasional highly contaminated fish (1000–2000 counts per minute) were being caught in coastal waters.[6]

Examination of many fishing-boats and their catches has shown that radioactive contamination of the water and of the fish in the Pacific persisted at least for months and extended from around the coast of Japan in the north as far south as New Guinea or Australia, from near Taiwan (Formosa) in the west to Hawaii in the east (see figure). Oceanic currents had played a part. The Japanese government sent a scientific observation ship to make specimen catches in various parts of the ocean and to examine the water and zooplankton. Radioactive contamination of fish was found to be associated with widespread contamination of zooplankton and of the upper 50–100 metres of the sea. In other words at least half the Pacific was contaminated and abounded with radioactive fish. In the Bikini area maximum counts of 6000–7000 per minute were found. The fish population in the Pacific may be permanently affected: for example, their numbers may be decreased by lethal mutations.

Thus the whole Japanese people were eating radioactive fish, bread, rice, and vegetables, drinking radioactive tea, and inhaling radioactive dust in the air for months after the Bikini explosion. The dose per head of population was probably insufficient to cause acute radiation disease (except to the Marshall Islanders who have suffered the bloody diarrhœa, epilation, and leucopenia of radiation disease) but the cumulative action of continuous small doses of radiation upon the whole Japanese people (and no doubt upon the populations of other countries) may well have unfavourable genetic effects upon future generations.

Doctors have to defend the public health. If, for example, the water-supply of a city were poisoned by arsenic, steps would be taken to ensure that no further contamination could take place. For this reason, my colleagues in the commission and I believe that it is the duty of doctors all over the world to call for the prohibition of explosions which are a menace both to mankind today and to future generations.

I am indebted to Prof. J. B. S. Haldane and Prof. L. S. Penrose for their helpful comments on Professor Hayashi's paper.

Pathology Department, Birmingham Accident Hospital. S. SEVITT.

Medicine and the Law

An Overlooked Swab

A SURGEON performed a successful cæsarean section on a patient in a nursing-home, but a swab or pack placed in situ by the surgeon before delivering the baby was found and removed six days later. Before closing the peritoneum, the surgeon had been told by the theatre sister that the count of swabs was correct. In the resulting action for negligence Mr. Justice Pearson awarded damages of £3000 and £1146 respectively to the patient and her husband, holding the surgeon and the nursing-home liable in equal shares.[1] The surgeon appealed, contending that the whole liability should fall on the nursing-home, which had accepted the finding of negligence against the sister. The Court of Appeal dismissed the appeal and refused leave to appeal to the House of Lords on the ground that the question involved was one of fact.

LORD JUSTICE SINGLETON said that it had been suggested that the judge's decision was wrong in that the surgeon's conduct of the operation was supported by well-recognised surgical practice and a layman should not judge such matters. No such point arose here; but it was right to say that it was no part of a judge's duty to tell surgeons how they should perform their duties. That would not be for the good of surgeons, or lawyers, or the community. The judge had to determine every charge of negligence on the evidence before him; and it was clear that Mr. Justice Pearson had not gone one step beyond the facts in this case, which had to be decided largely on the evidence of the surgeon himself.

His answers showed that he did not remember the details of this particular operation, and had spoken rather of his usual practice. He had said that he was justified in relying on the count of this most experienced sister. This nursing-home provided packs with tapes attached. Some surgeons attached Spencer-Wells clips or small rings to the tapes. This surgeon did not use tapes, clips, or rings. On the evidence of other surgeons it could not be said that a surgeon who did not use any of these was negligent. But the evidence did not disclose any reason why tapes with clips or rings should not be generally used, for everyone seemed to agree that they were an additional precaution. A surgeon who discarded or disregarded that safeguard placed an additional burden on himself.

The plaintiff's case had been that the surgeon must look and feel for the packs which he had himself put in. The surgeon had pointed out the danger in this operation of too much interference with the intestines. He said that he looked; that he would have expected to feel a pack in the position in which this pack had been left; and that he must have been satisfied that there was no pack remaining in the body or he would not have stitched up. His usual practice was to place three packs, one each side and one in front of the uterus. He was uncertain whether he had placed two or three packs in those positions. If he was doubtful, he ought to have felt with his finger in the way that Prof. W. W. Nixon, Mr. Aleck Bourne, and Mr. John Howkins had agreed in their evidence was reasonable or proper. He did not do so.

The patient was entitled to expect that the surgeon would do what was reasonable to ensure that packs were removed from the body before he asked if the count was correct. The one was independent of the other. The sister's count was an additional check for the protection of both patient and surgeon. That it failed

1. See *Lancet*, 1955, i, 680.

occasionally only emphasised the need for diligence on the surgeon's part. The judge was right and the appeal should be dismissed.

LORD JUSTICE HODSON, agreeing, said that if a pack or swab was left in a patient's body by a surgeon in the course of an operation, that of itself called for an explanation from him. It would be unfair to this surgeon to say that his evidence showed that he relied on the sister's count as the last, first, and only precaution; and it must be accepted that he had no duty to count all the packs, for to do so would distract a surgeon from his task. But though this surgeon did not use clips, he had taken no step to draw the sister's attention to the particular places where he put the packs. His Lordship could see no reason why when a surgeon reached the stage of recovering packs he should not make some mental effort to think what packs ought to be there, particularly when they had been placed in a standard pattern round the uterus. The surgeon had fallen short of the standard of care required of him, and was equally responsible with the sister.

LORD JUSTICE MORRIS also agreed. The Court was not here called to choose between the competing opinions of those with experience in surgery. This surgeon on the evidence had taken no step which was designed to minimise the risk of a pack being overlooked in the event of the sister making a mistake.

URRY *v.* BIERER.—*Court of Appeal:* Singleton, Hodson, and Morris, *L.J.J.*: July 15, 1955. Counsel and Solicitors: H. V. Lloyd-Jones, Q.C., and J. R. Cumming-Bruce (Hempsons); Martin Jukes, Q.C., and Harris Walker (J. F. Coules & Co.); R. F. Hannay (Charles Russell & Co.).

M. M. HILL
Barrister-at-Law.

Obituary

HENRY TREGELLES GILLETT
M.D. Lond.

Dr. Gillett, who died in Oxford on June 26 at the age of 84, was of Quaker stock on both his father's and mother's sides. Born in Banbury, he qualified from St. Bartholomew's Hospital in 1895, and in 1907 took his M.D. Lond. After holding resident appointments at London hospitals, he married Miss Lucy Bancroft of Wilmington, Delaware, and for a time considered making his life in the United States; but he eventually settled in Oxford, where he practised for some fifty years.

This mere recital of facts gives an inadequate picture of the real man, who, as well as being a conscientious, capable, and much-loved family doctor, added many other facets to a full life. He gave richly to a wide circle. He was active on both the religious and administrative sides of the Society of Friends, and strove always to apply his Christian principles to medicine, as indeed to all his activities. His conscience made him a pacifist, at times almost a militant one, and he was always to be found on the side of the under-dog. There was, however, nothing dull about him, and his intense convictions on religious and social questions did not blunt a keen and sometimes impish sense of humour. The range of his interests is shown by his two books, one on vaccine therapy in respiratory infections, and the other, published only three years ago, on the *Spiritual Basis of Democracy*. During the depression between the wars he played a prominent part in the foundation and maintenance of the Quaker settlement for the rehabilitation of unemployed miners at Maes-y-haf in South Wales. He served the city of Oxford as councillor and alderman, and in 1938–39 was mayor. His unflagging energy was always at the service of his chosen causes, and age dimmed none of his enthusiasms or his determination to battle for what he knew was right. He will be held in grateful remembrance by a host of patients and friends.

There were five children of the marriage, of whom four survive him. The two sons are both doctors and the elder is in his father's old practice.

Notes and News

THE VINCENT SQUARE LABORATORIES

ON July 12 Lord Nathan, chairman of Westminster Hospital, opened new laboratories forming part of the hospital's development scheme. Comprising departments of morbid anatomy, chemical pathology, bacteriology, and hæmatology, these will serve particularly the three hospitals in or near Vincent Square (the Children's Hospital, the Gordon Hospital, and All Saints' Hospital) which are constituents of the Westminster teaching group.

An account of the project and its history was given by Prof. R. J. V. Pulvertaft as head of Westminster Hospital's pathology services; and a tribute to his "inspiration and persistence" was paid by Lord Nathan, who spoke also of the contribution made on the biochemical side by Prof. N. F. Maclagan. The three constituent hospitals (Lord Nathan said) had, between them, 260 beds, with gastro-intestinal, pædiatric, genito-urinary, and gynæcological units, and the Horseferry Road laboratories of Westminster Hospital were not equipped or staffed to do the work they required. The laboratory now built to serve them was one of the first hospital laboratories put up since the war and was modern in its facilities, both for routine investigation and for research. "A main purpose of this laboratory, in common with all others in the Westminster Hospital teaching group, is to fuse as closely as possible the pathological investigations and research projects with the clinical problems, and—most important—to encourage the clinicians to take an active interest in the daily workings of research." The facilities offered were not in any way confined to workers in the three hospitals for which the laboratory was principally designed, and already three members of the staff of Westminster Hospital had investigations in progress or in prospect there.

The building includes, besides the laboratories, an animal-house, a conference room, an office, and rooms for blood-transfusion and photography; and the architects were Mr. Alver Hall and Mr. Cole Adams. The director of the laboratories is Dr. George Lumb (university reader in pathology), and the deputy director Mr. J. H. Wilkinson, PH.D., F.R.I.C. The departmental staff, all of whom take an active part in teaching students of Westminster Medical School, are: morbid anatomy, Dr. Lumb and Dr. R. H. B. Protheroe; chemical pathology, Dr. Wilkinson, Dr. R. M. Haslam, and Mr. B. T. Chadwick; bacteriology, Dr. G. I. M. Ross; and hæmatology, Dr. W. M. Edgar. On the opening day an excellent exhibition of work in progress had been laid out, including studies in ulcerative colitis, diarrhœa in infancy, exfoliative cytology, and thyroid biochemistry.

In the first three months of next year Dr. Lumb will be visiting professor in pathology in the University of Tennessee, and Lord Nathan expressed a hope that an exchange system would be developed "whereby research-workers and clinicians may have an opportunity to visit America, while their colleagues from the States come over here to work in the wards and laboratories of the Westminster."

THE RENAL CIRCULATION

SINCE 1947, when Professor Trueta and his colleagues at Oxford produced their monograph on the renal circulation much has been written in support or rebuttal of their findings and conclusions. On the whole the support has come chiefly from anatomists and clinicians, while the biochemists have been sceptical, particularly those belonging to the physiological schools of Homer Smith and Van Slyke. It might be fair to say that a growing number of authorities now agree—with reservations varying in extent—that there is more than one type of circulation through the kidney.

In a monograph published last year by the faculty of medicine of Coimbra in Portugal de Carvalho[1] reviews in detail the different concepts of urine formation, and includes references to some German and Austrian writings which have had little attention in this country—particularly those of Fuchs, Popper, Mandel, and Frey who in earlier days suspected the existence of some kind of renal medullary by-pass and even attempted to relate diuresis to the opening of the juxta-medullary vessels. The second part of the book describes

1. Contribuicao para o Estudo da Circulacao Renal (Contribution to the Study of the Renal Circulation). By A. A. M. SIMOES DE CARVALHO. Coimbra, 1954; pp. 309.

work done by de Carvalho in the rabbit, using techniques not very unlike those of the Oxford investigators—among them microradiography and also angiography for which the Portuguese school, as the inventor of the procedure, has always had a high reputation. About 60 experiments are reported in some detail.

Finally the monograph discusses the mechanisms which bring the cortico-medullary circulation into operation. In his conclusion de Carvalho says that he has confirmed the work of the Oxford investigators, adding that the opening of the juxtamedullary circulation corresponds to an increase of diuresis. Also he describes the easy passage of the blood through the vessels of the renal perihilar region. An 8-page summary in English and also in French and German is appended.

TREATMENT OF ANTHRAX, BOTULISM, AND SNAKE-BITE

EMERGENCY supplies of sera for the treatment of anthrax, botulism, and snake-bite are kept at the following centres:

Newcastle Region
Dispensary, Cumberland Infirmary, Carlisle (tel. 22332).
Dispensary, Newcastle General Hospital (35211).

Leeds Region
Castle Hill Hospital, Cottingham, Hull (Cottingham 47372).
Seacroft Hospital, York Road, Leeds (45194).

Sheffield Region
Nottingham City Hospital, Hucknall Road, Nottingham (63351).

East Anglia Region
Regional Blood Supply Depot, Brookland Avenue, Cambridge. Monday–Friday 8.30 A.M.–5.30 P.M., Saturday 8.30 A.M.–12.30 P.M.: 56912. Other times: 56913.

North East Metropolitan Region
North Middlesex Hospital, N.18.
Day, chief pathologist; night, resident pathologist: Tottenham 3071.

South East Metropolitan Region
South East Sub-Depot, Weavering House, Ashford Road, Maidstone, Kent.
Day service: 4468, 3604.
Night service: 4660, 3718.

South West Metropolitan Region
South London Blood Supply Depot, Stanley Road, Sutton, Surrey (Vigilant 8221).
Dispensary, Royal South Hants and Southampton Hospital (snake-bite antiserum only*) (26211).

Oxford Region
Northampton General Hospital (4680).
Royal Berkshire Hospital, Reading (51721).

South Western Region
Ham Green Hospital, Bristol (31165).
Pathological Department, Royal Devon and Exeter Hospital, Exeter (3519, 2261†).
Scott Isolation Hospital, Plymouth (64311).
Pathological Department, Royal Cornwall Infirmary, Truro (3029).

Welsh Region
Caernarvon and Anglesey General Hospital, Bangor (botulinum and snake-bite antisera only) (1181).
City Isolation Hospital, Cardiff (21466).
West Wales General Hospital, Glangwili, Carmarthen (botulinum and snake-bite antisera only) (7433).

Birmingham Region
Dispensary, Selly Oak Hospital, Birmingham (Selly Oak 1361).

Manchester Region
Dispensary, Manchester Royal Infirmary (Ardwick 3300).

Liverpool Region
Fazakerley Isolation Hospital, Liverpool (Aintree 2324).

* This hospital carries anti-snake serum, not only against native snakes, but against tropical snakes which may be imported with cargoes arriving at the docks.
† When laboratory closed.

DANGEROUS DRUGS

THE Home Secretary has issued an order (SI. 1955, no. 872) bringing the following drugs under the control of part III of the Dangerous Drugs Act, 1951:

Diethylthiambutene (3-diethylamino-1:1-di-(2-thienyl)-1-butene).
1-Methyl-4-phenylpiperidine-4-carboxylic acid isopropyl ester.
Normethadone (4:4-diphenyl-6-dimethylamino-3-hexanone).

Universities Federation for Animal Welfare

The federation is holding its summer school this year at Westham House, Barford, Warwick, from Sept. 24 to Oct. 1. There will be expeditions to a dairy farm, Dudley Zoo, and a slaughterhouse, and lectures on animal behaviour, animals in zoos and circuses, slaughtering methods, animals in research, dairy husbandry, and whaling. Further information may be had from the branch organiser, UFAW, 7a, Lamb's Conduit Passage, London, W.C.1.

University of London

Mr. G. W. Taylor, acting assistant director of the surgical professorial unit at St. Bartholomew's Hospital Medical College, has been appointed to the university readership in surgery at the college.

At recent examinations for academic postgraduate diplomas the following were successful:

Dip. Bact.—Zuhayr Hasan Annab, Joan R. Davies, P. S. Gardner, P. D. L. Guilbride, Margaret P. Jevons, J. C. Kelsey, E. P. Lindley, L. D. Sachdeva, Harbans Singh Sodhi, I. O. Stewart, C. E. D. Taylor, W. R. G. Thomas.

D.P.H.—E. O. Barnes, Gunvantray Jatashanker Bhatt, Sailendra Kumar Bose, Ahmed Bukhari, G. C. R. Carey, Niranjan Chatterjee W. W. Cowen, Waldemar Drawneek, Michael Gibbs, D. H. S. Griffith, Aarne Sakari Härö, Patricia Herdman, A. C. Howard, Eric James, W. T. Jones, Jogindar Singh Khurana, J. O. Kjellander, S. J. Krister, W. W. Laughland, Mary Lightbody, Sarah Lorimer, Patricia E. V. McFarland, P. O. M. McGirr, Thomas McKendrick, E. D. Many, G. G. J. Mettrop, K. H. Meller, Abdel Fattah Mowafi, G. G. Murphy, W. P. Nelson, William Ouko, C. S. Pitt, Malathi Rajasingham, T. A. I. Rees, M. O. Richardson, A. D. Robertson, W. R. Rochester, Armia Mina Said, Yosef Sayegh, Ravindra Nath Varma, Elizabeth G. Vaughan, J. C. Wyatt, Francis Zammit.

D.T.M. & H.—M. T. Ashcroft, Abudu Rasaki Oladeinde Bakare, Hsien-Chen Hsieh, Khalid Asa'd Shami, Vaiyapuri Velayudhan.

University of Birmingham

On July 2 the honorary degree of doctor of laws was conferred on Prof. H. F. Humphreys. The following degrees were also conferred:

M.D.—W. T. Cooke, Brian MacMahon (with honours); H. G. H. Richards.

Ph.D.—E. A. Smith, A. G. W. Whitfield.

M.B., Ch.B.—Molly Hill (with second-class honours); Jean E. M. Baron, Brenda L. Bodenham, F. S. Boi-Doku, Ann D. Braham, Jeanne L. Brough, G. T. Brown, K. G. Buckler, P. J. Chaudoir, Jay-Gopal Chitnis, A. E. Cutler, T. S. Dogra, Denise J. Duchesne, J. L. Dyke, Elizabeth A. Fisher, Christine M. Fitzgerald, C. B. Franklin, Elizabeth George, J. D. Goode, C. M. Green, Peter Hall, Sheila P. Hancock, Barry Hansell, A. J. Harbott, M. A. Harper, Pamela A. Harris, B. G. Harwin, John Haslam, C. N. Haynes, R. W. Heslop, Margaret W. Hill-Owens, J. R. Holliday, Gabriel Horn, Julia C. Hurford, G. T. Kelley, J. N. Kille, D. G. Larard, J. D. Leng, Leslie Lewis, H. McD. Liegeois, M. B. Love, Mary L. Mackay, R. B. Miller, Valerie E. Millward, Mary G. M. Moss, P. M. Moss, S. H. Nicolaides, G. D. Officer, A. L. Parker, A. W. Parkes, J. L. Pearce, D. C. Pearson, Eric Peters, D. M. Price, Bryony B. Reid, R. F. Reynolds, M. T. Rigby, R. O. Rimmer, M. L. Rutter, Frank Sayer, Betty V. Scott, R. C. Shapiera, Helen R. Sharples, Roy Summerly, Robert Tinkler, J. A. Tooth, G. J. Varley, D. M. Ward, M. S. Warwick, J. L. Webster, Myrtle E. White, B. N. Williams, M. A. Woodhouse.

University of Glasgow

On July 9 the diploma in public health was awarded to the following:

K. F. X. Bourke, D. P. Brunton, W. R. Falconer, D. J. B. Fletcher, A. N. Hunter, I. S. Macdonald, Sheila F. Schofield, D. J. L. Tredoux, Cameron Weymes, S. M. Young.

Royal College of Physicians of London

On July 14, Queen Elizabeth, The Queen Mother, dined with the president and fellows of the college.

Royal College of Surgeons of Edinburgh

At a meeting of the college held on July 13, with Prof. Walter Mercer, the president, in the chair, the following were admitted to the fellowship:

Syed Mohamed Alwi Alhady, Ary Blesovsky, P. A. Boa, Manash Kumar Roy Chowdhury, Emmanuel Evans-Anfom, Joseph Hon-Yin Fung, Roshan Lall Gupta, H. C. Hastings, John Humphreys, I. F. MacLaren, Jogeswar Mahanta, Man Mohan Malhotra, M. R. Neely, E. C. Neser, J. E. Newsam, Lajpat Rai Pathak, A. E. Pritchard, C. M. Sarkin, Barry Sender, Pravinchandra Amratlal Shah, M. B. Wingate.

National University of Ireland

Dr. Thomas Murphy has been appointed to the professorship of social and preventive medicine in University College, Dublin.

Royal College of Physicians of Ireland

At a meeting of the college held on July 1, with Dr. Edward T. Freeman, the president, in the chair, the following were admitted licentiates in medicine and midwifery:

J. M. G. Anderson, Unus Omar Ali, D. C. Armstrong, Anthony Beadman, H. W. Beaumont, T. E. Bourke, William Brereton, Mary B. McK. Butler, C. S. Christopoulos, Patricia Clement, W. G. Cooke, Marcella Davies, S. B. Day, M. G. Dignan, Jean Fishman, H. J. Galvin, Jan Golaszewski, T. A. I. Grillo, H. G. Haynes, Tine E. J. M. Haynes, M. B. Kilcoyne, T. E. Lear, M. B. Levine, Geroid Lynch, Geraldine B. McKevitt, W. E. Mackinnon, David McSwiggan, F. J. McVerry, Daniel Maher, Roman Migodzinski, G. G. Noott, J. N. O'Donnell, D. C. Paterson, Satyavrat Ramrakha, K. B. A. Stanley, R. H. W. Treneman, E. L. Norman-Williams, E. S. Williams.

Royal College of Surgeons of England

At a meeting of the council held on July 14, Sir Harry Platt was re-elected president, and Mr. Julian Taylor was re-elected and Mr. R. P. Scott Mason elected vice-presidents for the ensuing year. Prof. Paul Santy (Lyons) was admitted to the honorary fellowship. Mr. A. Lawrence Abel, Mr. R. H. O. B. Robinson, Mr. Harold C. Edwards, and Dr. Frankis Evans were admitted to the council. Mr. A. C. H. Bell was coöpted to the council for the year 1955–56, representing gynæcology and obstetrics.

The Hallett prize was awarded to Dr. B. J. Dooley (Melbourne). Dr. Angus Macpherson was re-elected Laming Evans research fellow for a third year. The Gilbert Blane medal for 1955 was awarded to Surgeon Lieut.-Commander W. H. B. Ellis.

The following lecturers were appointed:

Thomas Vicary lecture.—Prof. K. F. Russell (Melbourne).

Hunterian professorships.—Mr. E. Rohan Williams, skull at birth; Mr. Ashton Miller, diverticulum of the bladder; Mr. Eric Samuel, anatomy of the bile ducts in relation to the post-cholecystectomy syndrome; Mr. D. M. Wallace, natural history and possible cause of bladder tumours; Mr. Santokh Singh Anand, hypertrophic ileo-cæcal tuberculosis in Indian patients; Mr. J. H. Peacock, ætiology, diagnosis, and treatment of Raynaud's disease, Raynaud's phenomenon, and acrocyanosis in the upper limb; Mr. B. B. Milstein, cardiac arrests and resuscitation; Mr. F. T. Graves, anatomy of the intrarenal arteries in health and disease; Mr. J. S. R. Golding, bone changes in sickle-cell anæmia; Mr. Leon Gillis, amputations in children; Mr. Bishnupada Mukopadhaya, rôle of excisional surgery in the treatment of bone and joint tuberculosis; Mr. E. F. Chin, surgery of funnel chest and pigeon chest; Mr. C. W. D. Lewis, melanomas and melanosis; Mr. W. J. W. Sharrard, muscle paralysis in poliomyelitis; Mr. Charles Marks, observations on the surgical sequelæ of bilharzial disease.

Arris and Gale lectures.—Mr. F. D. Hart, hormone replacement therapy in the surgery of endocrine disorder; Mr. Roger Warwick, functional topography of oculomotor nuclei; Mr. J. D. Griffiths, surgical anatomy of the blood-supply of the distal colon.

Erasmus Wilson demonstrators.—Mr. B. E. Heard, Mr. J. S. Young, Mr. L. M. Franks, Mr. L. W. Proger.

Arnott demonstrators.—Mr. G. W. Causey, Mr. David Slome, Mr. Frank Stansfield, Mr. R. J. Last, Mr. R. McP. Livingston, Miss Jessie Dobson.

A diploma of fellowship was granted to W. A. Malik.

It was reported that Edward Lumley research fellowships had been established in the Royal Australasian College of Surgeons, by which young surgeons from that country could pursue clinical and research activities in this college in London and the hospitals associated with it.

The council agreed to a number of measures designed to facilitate the arrangements for reciprocity of primary fellowship examinations with other colleges of surgeons.

On Thursday, July 28, at 5 P.M., at the college, Lincoln's Inn Fields, London, W.C.2, Prof. Frederick G. Kergin, senior surgeon to the Toronto General Hospital, will give a Hunterian lecture on the Treatment of Chronic Pleural Empyema.

Yorkshire Society of Anæsthetists

On Wednesday, July 27, at 8.30 P.M., at the General Infirmary, Leeds, Dr. D. G. Melrose will speak on Hypothermia.

Scottish Society of Anæsthetists

The following officers have been elected for 1955–56:

President, Dr. F. G. Gibbs; vice-president, Dr. H. Bruce Wilson; hon. secretary, Dr. A. G. Miller; other members of council, Dr. I. M. Campbell Dewar, Dr. D. W. Shannon, Dr. M. Shaw, Dr. R. Lawrie, Dr. J. W. Levack, Dr. W. Auld, Dr. F. Holmes.

The society's prize for the best paper submitted by an anæsthetist of senior registrar grading or below was awarded to Dr. A. H. B. Masson.

Uganda Medical and Health Services

On Feb. 16, the legislative council resolved that a committee be appointed "to examine the present stage of development of medical and health services in the Uganda Protectorate and, having regard to available resources of manpower and finances, to make recommendations for future policy." The Governor has now appointed the following members:

Dr. A. C. Frazer, professor of pharmacology, Birmingham University (chairman); Mr. H. J. Croot, professor of surgery, Makerere College Medical School; Mrs. Florence Lubega, member of Makerere College council; Hon. J. M. Madhvani, B.SC., LL.B., member of legislative council; Dr. I. K. Majugo, general medical practitioner; Captain H. M. Naylor, chairman, Toro Tea Company; Dr. S. J. Scurlock, senior administrative medical officer, Birmingham Regional Hospital Board; Dr. Cicely D. Williams, of the London School of Tropical Medicine and Hygiene.

The secretary of the committee may be addressed at the P.O. Box 101, Entebbe, Uganda.

Society of Apothecaries of London

On July 19 Sir Cecil Wakeley, the Master, on behalf of the court conferred the mastery of midwifery, honoris causa, on Dame Hilda Lloyd and Sir Arthur Gemmell. The gold medal in therapeutics was presented to Sir Russell Brock.

Royal Medical Benevolent Fund

The 190th annual general meeting is to be held at 11, Chandos Street, London, W.1, at 5 P.M., on Thursday, July 28. Lord Webb-Johnson will take the chair.

Medical Society for the Study of Venereal Diseases

At a meeting of this society at 11, Chandos Street, London, W.1, at 8 P.M., on Friday, July 22, Dr. R. R. Willcox will open a discussion on the Future of Venereology.

Congress of Neurological Surgeons in United States

This Congress will be held in Los Angeles, California, from Oct. 27 to 29. Further particulars may be had from Dr. Philip D. Gordy, 1007 Delaware Avenue, Wilmington, Delaware.

Association Européenne Contre la Poliomyélite

The third symposium of this association is to be held at Zürich on Sept. 29 and 30 under the presidency of Prof. G. Fanconi. Further particulars may be had from Dr. P. Recht, 67, Boulevard Auguste Reyers, Brussels.

Royal Society of Medicine

Honorary fellowships have been conferred on Sir Wilfred Fish, Prof. W. R. Hess, Sir Geoffrey Jefferson, F.R.S., Dr. I. W. Magill, Prof. A. H. Olivecrona, and Prof. Emil Novak (*in absentia*).

Sir Geoffrey Jefferson, F.R.S., has been appointed Hughlings Jackson lecturer and medallist for 1955. He has chosen as the subject of the lecture, which he will deliver on March 1, The Neurology of the Trigeminal Nerve.

Appointments

ANDERSON, A. B., PH.D. Camb., B.SC. Adelaide, M.R.C.S., F.R.I.C.: pathologist, St. Bartholomew's Hospital, lecturer in chemical pathology at the medical college.

BOLTON, ANNE, M.B. Camb., M.R.C.P., D.P.M.: consultant physician in psychological medicine, Elizabeth Garrett Anderson Hospital, London.

CARRUTHERS, J. K. M., M.B. Lond.: whole-time asst. chest physician (S.H.M.O.), Cardiff chest clinic.

DHOLE, M. K., M.B. Lucknow, T.D.D.: whole-time asst. chest physician, Wrexham chest clinic.

GREEN, R. A., M.B. Camb., F.F.A. R.C.S., D.A.: part-time consultant anæsthetist, Royal Free Hospital, London.

JENNINGS, ELIZABETH M., M.B. Lpool, D.OBST.: asst. county M.O., Hertfordshire.

LEVY, JACK, M.B. Glasg., D.O.M.S.: ophthalmologist (S.H.M.O.), Edinburgh Royal Infirmary.

LYONS, A. R., M.D. Belf., M.R.C.P., D.M.R.T.: whole-time second consultant radiotherapist, Northern Ireland radiotherapy centre, Purdysburn, Belfast.

MACAULAY, D. B., M.B. Lpool, M.R.C.P.: consultant allergist, the David Lewis Northern Hospital and the Liverpool Ear, Nose and Throat Infirmary.

MCCORMACK, JOHN, M.B. Durh.: asst. school M.O., Newcastle upon Tyne.

NORTH, H.D.B., M.B. Manc., D.P.H.: M.O.H., West Bridgford urban district and Bingham rural district.

OLDHAM, K. W., M.R.C.S., D.A.: whole-time asst. anæsthetist (S.H.M.O.) to the Northampton and District H.M.C.

THOMPSON, R. C. W., M.B. Lond., F.F.A. R.C.S., D.A.: part-time consultant anæsthetist, Charing Cross Hospital group.

WATKINS, MONICA E., M.B. Lond.: asst. county M.O., Hertfordshire.

Colonial Medical Service:

APIVOR, T. D., M.R.C.S., F.F.A. R.C.S., D.A.: M.O. (anæsthetist), grade A, Trinidad.

CRAWFORD, B. K. A., L.R.C.P.E.: M.O., Kenya.

FORRESTER, A. T. T., M.B. Lond.: M.O., Kenya.

HARRISON, J. P., M.R.C.S., L.D.S.: Senior M.O. (administration), Northern Region, Nigeria.

HUMPHRIES, S. V., M.R.C.S.: D.M.O., Bahamas.

MACKAY, C. G. G., M.B. Edin., F.R.C.S.: M.O. (special grade), Northern Region, Nigeria.

MERCER, J. W., M.R.C.S.: M.O., Northern Region, Nigeria.

NICHOLSON, J. A. B., M.B.E., M.B. Lpool, D.P.H.: senior health officer, Medical Field Units, Northern Region, Nigeria.

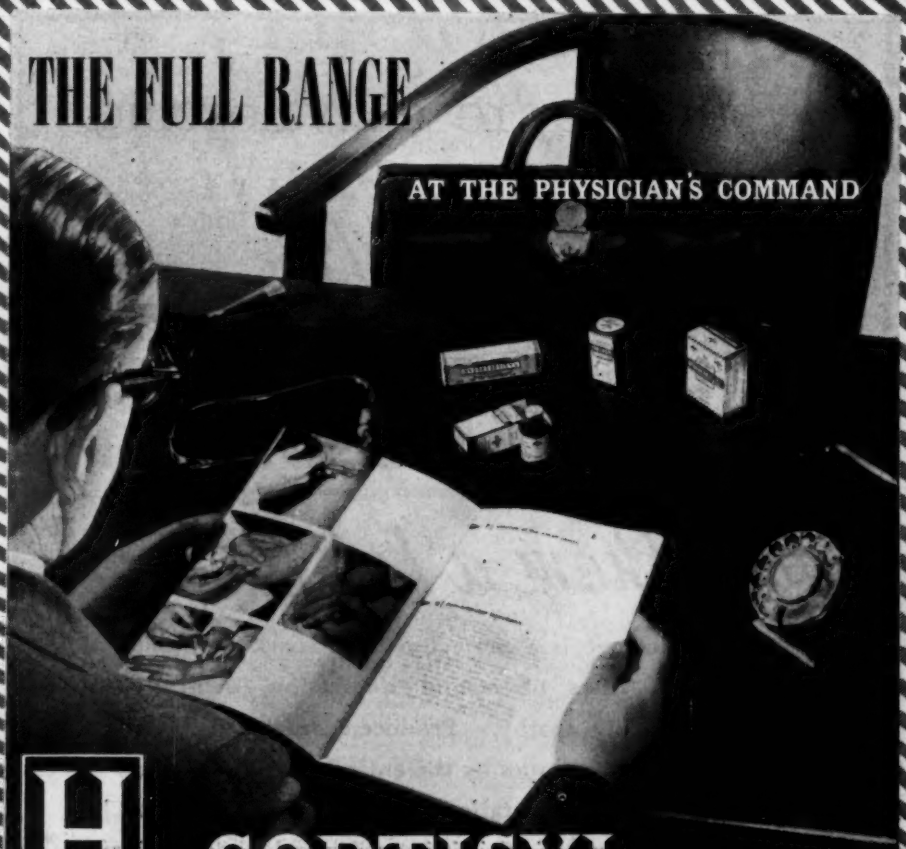
Births, Marriages, and Deaths

BIRTHS

DANIEL.—On July 11, at the Jessop Hospital, Sheffield, to Rhianydd, the wife of Mr. Owen Daniel, F.R.C.S.—a son.

THE FULL RANGE

AT THE PHYSICIAN'S COMMAND



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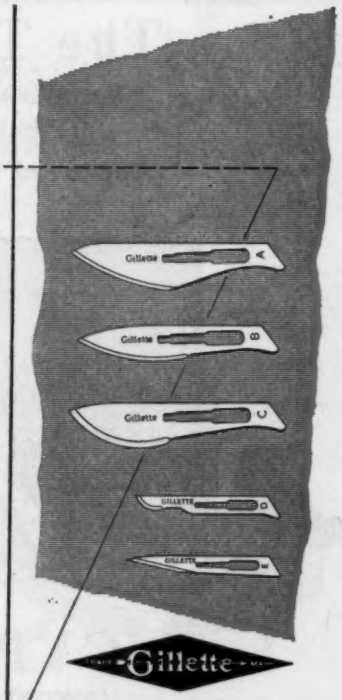

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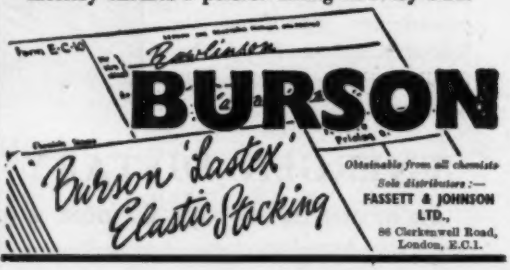

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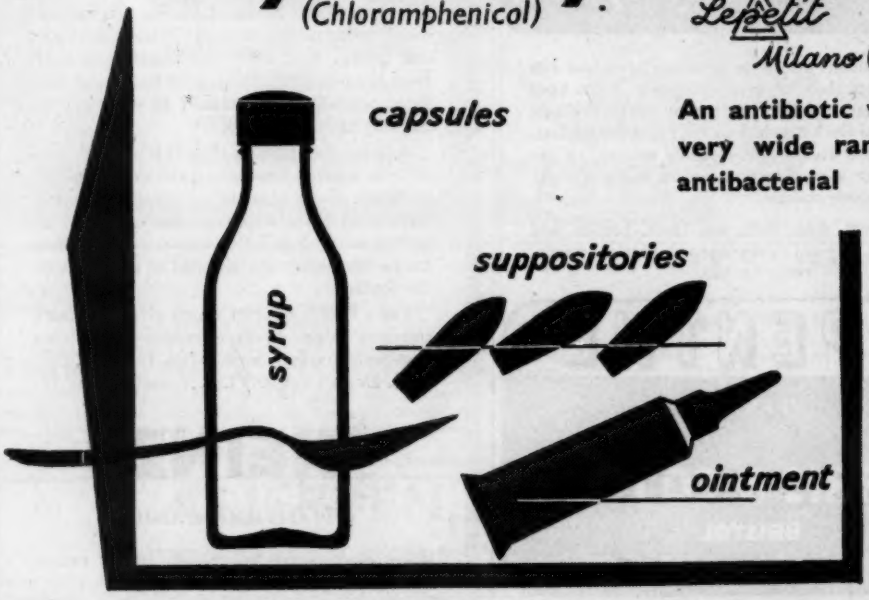

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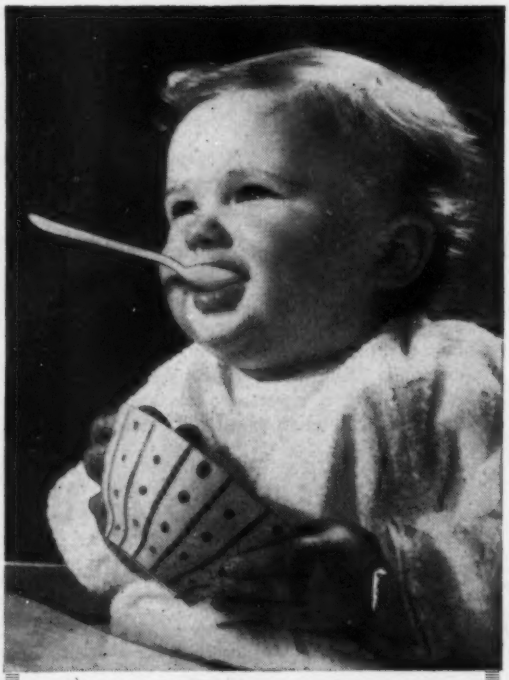

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Vacancies

ACADEMIC AND EDUCATIONAL SECTION — Page 42

ADMINISTRATIVE
South West Met. R.H.B. Asst. Sr. M.O. 43

ANÆSTHETICS
Central Middlesex, N.W.10. Sr. Reg. 43
Hackney, E.9. Sr. H.O. 43
Hosps. for Diseases of the Chest. Reg. 44
St. George's, S.W.1. Sr. Reg. 44
St. Thomas's, S.E.1. P.-t. Cons. .. 42
Birmingham Accident. Sr. H.O. .. 46
Birmingham United Hosps. Sr. Regs. 45
Bradford. St. Luke's. Sr. H.O. .. 46
Bristol. Southmead Gen. Hosp. Group M.C. Sr. H.O. 46
Cambridge. Addenbrooke's. Sr. H.O. 46
Cheltenham Group H.M.C. Sr. H.O. .. 46
Chertsey. St. Peter's. Sr. H.O. .. 46
Colchester. Essex County. Sr. H.O. .. 47
Enfield. Chase Farm. Sr. H.O. .. 47
Harold Wood, Essex. Sr. H.O. .. 48
Ipswich & East Suffolk. Sr. H.O. .. 48
Leamington Spa. Warneford. Sr. H.O. 48
Leeds R.H.B. P.-t. Cons. 42
Leeds R.H.B. Regs. 49
Manchester R.H.B. Locum Sr. H.M.O. 42
Manchester. Withington. Sr. H.O. .. 49
Oxford United Hosps. Reg. 50
Perth Royal Infy. Sr. H.O. 50
Plymouth. South Devon & East Cornwall. Sr. H.O. 50
Sheffield R.H.B. Cons. 43
Shrewsbury. Royal Salop Infy. & Copthorne. Sr. H.O. 51
Stoke-on-Trent. North Staffs Royal Infy. Sr. H.O. 51
Swansea. Sr. H.O. 52
Welsh R.H.B. Regs. 52
York County, City & Military (Civilian Wing). Sr. H.O. 53

CASUALTY
Connaught, E.17. Sr. H.O. 43
Hackney, E.9. Sr. H.O. 44
Royal Free, W.C.1. Sr. H.O. 44
St. George-in-the-East. E.1. Sr. H.O. 44
St. Mary's, W.2. Sr. H.O. 44
Wanstead, E.11. Sr. H.O. 45
Willesden Gen., N.W.10. Sr. H.O. .. 45
Bedford Gen. Locum Reg. 45
Bromley, Kent. Sr. H.O. 46
Derby. Derbyshire Royal Infy. Sr. H.O. 47
Edgware Gen. Locum Reg. 47
Edgware Gen. Locum Sr. H.O. .. 47
Enfield. Chase Farm. Sr. H.O. .. 47
Harold Wood, Essex. Sr. H.O. .. 48
Hounslow Gen. Sr. H.O. 48
Ilford. King George. Sr. H.O. .. 48
Isleworth. West Middlesex. Sr. H.O. 48
Leeds Public Dispensary & Hosp. Sr. H.O. 49
Maidstone. West Kent Gen. Sr. H.O. 49
Plymouth. South Devon & East Cornwall. Sr. H.O. 50
St. Helens & Dist. H.M.C. Sr. H.O. 52
Windsor. King Edward VII. Sr. H.O. 52
Channel Islands, Jersey. Gen. H.O. 53

CHEST AND TUBERCULOSIS
Brompton, S.W.3. Sr. H.O. & H.O.'s 43
Colchester. British Legion San. Sr. H.O. 47
Liverpool. Walton. Sr. H.O. 48
Manchester R.H.B. Regs. 49
Oxford United Hosps. Reg. 50
Stoke-on-Trent. Groundslow. Jr. H.M.O. 52

DERMATOLOGY
Derby. Derbyshire Royal Infy. Reg. 47
Glasgow. Stobhill Gen. Pre-reg. H.O.'s 48
Leeds United Hosps. Reg. 48
North West Met. R.H.B. Reg. .. 50

EAR, NOSE, AND THROAT
Ashford, Middx. H.O. 45
Birmingham & Midland Ear & Throat. H.O. 46
Birmingham R.H.B. Reg. 45
Hull A Group H.M.C. Sr. H.O. .. 48
Manchester R.H.B. Cons. 42
Reading. Royal Berks. H.O. .. 51
Salisbury Gen. Sr. H.O. 51
Stoke-on-Trent. North Staffs Royal Infy. Sr. H.O. 52
Wolverhampton Group. H.O. .. 53

GERIATRICS
Glasgow. Stobhill Gen. Pre-reg. H.O.'s 48
Leeds R.H.B. Sr. H.M.O.'s 42
Manchester R.H.B. Reg. 49
Newcastle R.H.B. Reg. 50

INFECTIOUS DISEASES
Ilford & Barking Group H.M.C. Sr. H.O. 48

MEDICINE
King Edward Mem., W. H.O. .. 44
London Jewish, E.1. H.O. 44
North Middlesex, N.18. Pre-reg. H.O.'s 44
St. Benedict's, S.W.17. Sr. H.O. .. 45
Birmingham R.H.B. P.-t. Cons. .. 42
Birmingham R.H.B. Regs. 45
Birmingham United Hosps. Reg. .. 45
Bishop's Stortford & Dist. Sr. H.O. 46
Bournemouth & East Dorset H.M.C. H.O. 45
Croydon. Mayday. Locum Reg. .. 47
Darlington Dist. H.M.C. Jr. H.M.O. 47
Epping. St. Margaret's & Honey Lane. H.O.'s 47
Grimsby Gen. Pre-reg. H.O. or Sr. H.O. 48
Hitchin. Lister. H.O. 48
Leeds. Jewish Herzl Moser. Locum Jr. H.M.O. 49
Leeds R.H.B. Reg. 49
Manchester R.H.B. Sr. Reg., Regs. & Locum 49
Nottingham Gen. Sr. H.O. 50
Otley, Yorks. Gen. Jr. H.M.O. or Sr. H.O. 50
Peterborough Mem. H.O. 50
Portsmouth Group H.M.C. Pre-reg. H.O.'s 50
Scotland. North-Eastern R.H.B. Sr. Reg. 51
Scotland. Northern R.H.B. Sr. H.O. 51
Stoke-on-Trent. North Staffs Royal Infy. Pre-reg. H.O. 52
Welsh R.H.B. Reg. 52
York Military (Civilian Wing). Sr. H.O. 53
Michigan, U.S.A. Oakwood. Residency 53
New York, U.S.A. Doctors Hosp. H.O. 53

NEUROLOGY
National Hosps. for Nervous Diseases. Sr. Reg. & Reg. 44
Newcastle United Hosps. Cons. .. 43

NEUROSURGERY
Bristol-Cossham/Frenchay H.M.C. Sr. H.O. 46
Swansea. Morriston. Sr. H.O. .. 52

OBSTETRICS AND GYNÆCOLOGY
Hackney, E.9. Sr. H.O. 44
King Edward Mem. & Perivale Maternity. Reg. 44
Mothers' (Salvation Army), E.5. Pre-reg. H.O. & H.O. 44
Queen Mary's Hosp. for the East End, E.15. Sr. H.O. & H.O. 44
Thorpe Coombe Maternity, E.17. H.O. 45
Wanstead, E.11. H.O. 45
Canterbury. Kent & Canterbury. H.O. 46
Cheltenham Maternity. H.O. .. 47
Epping. St. Margaret's & Honey Lane. Sr. H.O. 47
Isleworth. West Middlesex. Reg. .. 48
Leeds R.H.B. P.-t. Cons. 42
Manchester R.H.B. Regs. 49
Nottingham. Firs Maternity. Sr. H.O. 50
Peterborough Mem. H.O. 50
Plymouth. South Devon & East Cornwall. H.O. 50
Portsmouth Group H.M.C. Sr. H.O. 50
Reading. Royal Berks. H.O. .. 51
Rugby. Hosp. of St. Cross, & St. Mary's, Harborough Magna. H.O. 51
St. Andrews. Craigtoun Maternity. H.O. 52
Stockport. Stepping Hill. Sr. H.O. .. 52
Warrington Gen. Sr. H.O. 52
Windsor. King Edward VII. H.O. .. 52

OPHTHALMOLOGY
Bradford. Royal Eye & Ear. H.O. .. 46
Newcastle R.H.B. Sr. H.M.O. .. 43
Nottingham & Midland Eye Infy. Sr. H.O.'s 50
Stoke-on-Trent. North Staffs Royal Infy. Sr. H.O. 52
York County. Locum Sr. H.O. .. 53

ORTHOPÆDICS
Royal National Orthopædic, W.1. Reg. 44
Batley, Yorks. Gen. H.O. or Locum 45
Bedford Gen. Locum Reg. 45
Bolton Royal Infy. Sr. H.O. 46
Bournemouth. Royal Victoria. Sr. H.O. 45
Bradford. St. Luke's & Woodlands Hosp. Rawdon. Sr. H.O. 46
Bristol. Winford Orthopædic. Sr. H.O. 46
Colchester H.M.C. H.O. 47
Croydon Group H.M.C. Reg. & Locum Regs. 47
Croydon. Mayday. H.O. 47
Enfield. Chase Farm. Locum Reg. .. 47
Gravesend & North Kent. Locum Reg. 48
Grimsby Gen. Sr. H.O. or Locum .. 48
Kingston, Surrey. Sr. H.O. 48
Leeds. St. James's. Sr. H.O. .. 48
Lewes. Chailey Heritage (Craft School & Hosp.). Sr. H.O. 49
Louth County Infy. Sr. H.O. .. 49
Manchester R.H.B. P.-t. Cons. .. 42
Newcastle Gen. H.O. or Sr. H.O. .. 49
Newcastle R.H.B. Reg. 50
Nottingham Gen. Sr. H.O. 50
Portsmouth Group H.M.C. Sr. H.O. & Pre-reg. H.O. 50
Romford, Oldchurch. H.O. 51
Scunthorpe & Dist. War Mem. Reg. 51
Southampton. Royal South Hants. H.O. 51
Swansea. Sr. H.O. 52
Watford Peace Mem. H.O. 52
Welsh R.H.B. Reg. 52
Wigan. Royal Albert Edward Infy. Sr. H.O. 52
Yorkshire. East Riding H.M.C. H.O. 53

PÆDIATRICS
Children's, S.E.26. H.O. 43
Hammersmith, W.12. Locum Reg. .. 43
Hosp. for Sick Child., W.C.1. P.-t. Cons. 42
Paddington Green Child's, W.2. P.-t. Sr. Reg. 44
Bangor. St. David's. Sr. H.O. .. 45
Brighton. Royal Alexandra Hosp. for Sick Child. Sr. H.O. 46
Canterbury. Kent & Canterbury. H.O. 46
Hereford Gen. H.O. 48
Hillingdon, Middx. H.O. 48
Manchester R.H.B. Locum Sr. Reg. 49
Scotland. Eastern R.H.B. Locum Reg. 51
Scotland. South-Eastern R.H.B. Reg. 51

PATHOLOGY
Birmingham R.H.B. Regs. 45
Bury & Rossendale H.M.C. Sr. H.O. 46
Chelmsford H.M.C. Locum Reg. .. 46
Manchester R.H.B. Cons. 42
Nottingham Gen. Sr. H.O. 50
Plymouth. South Devon & East Cornwall Gen. Sr. H.O. 50
Scotland. South-Eastern R.H.B. Reg. 51

PLASTIC SURGERY
Chepstow, Mon. Sr. H.O. 47

PSYCHIATRY
St. George's, S.W.1. Reg. 44
St. Marylebone Hosp. for Psychiatry & Child Guidance, N.W.1. P.-t. Reg. 44
Derby. Pastures. Jr. H.M.O. .. 47
Hornchurch. St. George's. Locum Reg. 48
Leeds. Meanwood Park. Jr. H.M.O. .. 49
Leeds R.H.B. Reg. 49
Manchester R.H.B. Sr. Reg. .. 49
North West Met. R.H.B. Sr. H.M.O. 42
Norwich. Hellesdon. Reg. 50
Sheffield R.H.B. Sr. Reg. 51
South West Met. R.H.B. Cons. .. 43
St. Albans. Hill End. Reg. 52
St. Albans. Napsbury Mental. Jr. H.M.O. 52
Welsh R.H.B. Reg. 52

RADIOLOGY
Birmingham R.H.B. P.-t. Cons. .. 42
East Anglian R.H.B. Sr. H.M.O. .. 43
Leeds R.H.B. Sr. H.M.O. 42
Manchester R.H.B. Sr. Regs. .. 49
Scotland. South-Eastern R.H.B. Reg. 51
Sheffield R.H.B. Sr. H.M.O. 43
Dublin. National Mass-Radiography Assoc. Asst. Med. Directors .. 43

RADIOTHERAPY
Nottingham Gen. Sr. H.O. or Reg. 50
Sheffield R.H.B. Sr. Reg. 51

SURGERY
Central Middlesex, N.W.10. Pre-reg. H.O. 43
Dulwich, S.E.22. H.O. 43
King Edward Mem., W. H.O. 44
Mile End, E.1. H.O.'s 44
St. George-in-the-East, E.1. H.O. .. 44
Wanstead, E.11. H.O. 45
Aberystwyth Gen. Sr. H.O. 45
Barnstaple. North Devon Infy. Pre-reg. H.O. 45
Barry Accident & Surgical. Sr. H.O. 45
Batley, Yorks. Gen. H.O. or Locum 45
Bexhill, Sussex. H.O. & Pre-reg. H.O. 45
Birmingham R.H.B. Regs. 45
Bishop Auckland. Gen. H.O. .. 46
Blackburn Royal Infy. Sr. H.O. .. 46
Bolton Royal Infy. H.O. 46
Bradford. St. Luke's. H.O. 46
Bury & Rossendale H.M.C. Pre-reg. H.O. 46
Carlisle. Cumberland Infy. H.O.'s .. 46
Chelmsford. St. John's. Sr. H.O. .. 46
Chichester. Royal West Sussex. Sr. H.O. 46
Colchester H.M.C. H.O. 47
Croydon Gen. Reg. 47
Doncaster Royal Infy. H.O. 47
Douglas. Noble's Isle of Man. H.O. 47
Exeter. Royal Devon & Exeter. H.O. 47
Hemel Hempstead. West Herts. Pre-reg. H.O. 48
High Wycombe & Dist. War Mem. Sr. H.O. 48
Hove Gen. H.O. 48
Kidderminster & Dist. Gen. H.O. .. 48
Leeds R.H.B. Reg. 49
Liverpool. Newsham Gen. H.O. .. 48
Maidenhead. Reg. 49
Maidstone. West Kent Gen. Pre-reg. H.O. 49
Manchester R.H.B. Regs. 49
Newcastle Gen. Sr. H.O. 50
Newcastle R.H.B. Locum Cons. .. 42
Peterborough Mem. H.O. 50
Plymouth. South Devon & East Cornwall. Sr. H.O. 50
Portsmouth Group H.M.C. Pre-reg. H.O.'s 50
Reading. Battle. H.O. 51
Romford. Oldchurch. H.O.'s .. 51
Romford. Rush Green. H.O. .. 51
Scotland. Western R.H.B. Reg. .. 51
Scunthorpe. War Mem. Sr. H.O. .. 51
Slough. Upton. Locum Sr. Reg. .. 51
Southampton. Royal South Hants. H.O. 51
Stoke-on-Trent. City Gen. H.O. .. 52
Stoke-on-Trent. North Staffs Royal Infy. H.O. 52
Wakefield. Gen. Sr. H.O. 52
West Dorset Group H.M.C. H.O.'s .. 52
Windsor. King Edward VII. H.O. .. 53
Wolverhampton Group. H.O. .. 53
Worthing. Locum Reg. 53
Wrexham. Maelor Gen. Pre-reg. H.O. 52
Wrexham. War Mem. Pre-reg. H.O. 52
New York, U.S.A. Doctors Hosp. H.O. 53

THORACIC SURGERY
South East Regional Thoracic Surgery Unit, S.E.18. Sr. H.O. 45
South West Met. R.H.B. P.-t. Cons. .. 43

VENEREOLOGY
St. Thomas's, S.E.1. P.-t. Cons. .. 42

PUBLIC APPOINTMENTS 53
GENERAL PRACTICE 54
NON-MEDICAL 54
MISCELLANEOUS 54

The Terms and Conditions of Service of Hospital Medical and Dental Staff apply to all N.H.S. hospital posts we advertise, unless otherwise stated. Canvassing disqualifies, but candidates may normally visit the hospital by appointment.

Academic and Educational

INSTITUTE OF LARYNGOLOGY AND OTOLOGY
(UNIVERSITY OF LONDON)
330/332, Gray's Inn-road, W.C.1

ADVANCED REVISION COURSE for Final F.R.C.S. students; 8TH AUGUST–22ND OCTOBER, 1955. Arranged as part-time course (mostly evenings) to meet circumstances of students holding appointments. Fee £21.

Detailed syllabus obtainable from the Dean.

SOCIETY OF APOTHECARIES OF LONDON

DIPLOMA IN INDUSTRIAL HEALTH

The next Examination will begin on MONDAY, 5TH DECEMBER, 1955. The following Examination will be held in July, 1956.

For Regulations apply Registrar, Apothecaries' Hall, Black Friars-lane, London, E.C.4.

UNIVERSITY OF LONDON. The Senate invite applications for the READERSHIP IN MORBID ANATOMY tenable at the Royal Free Hospital School of Medicine (salary within range £1900–£2400 a year).

Applications (10 copies) must be received not later than 15th September, 1955, by the Academic Registrar, University of London, Senate House, W.C.1, from whom further particulars may be obtained.

THE MEDICAL COLLEGE OF ST. BARTHOLOMEW'S HOSPITAL, West Smithfield, E.C.1. Applications are invited for the post of SENIOR LECTURER IN ANATOMY, tenable as from 1st October, 1955, or as soon after as possible. The salary will be on a scale of £1250–£100–£1750, together with children's allowance and membership of the F.S.S.U. The commencing point on the scale will depend upon academic qualifications and experience in teaching and research.

Applications, which should be received not later than 31st August, 1955, should be addressed to the Dean of the Medical College, from whom further particulars may be obtained.

UNIVERSITY OF OTAGO AND MEDICAL RESEARCH COUNCIL OF NEW ZEALAND. CARDIOVASCULAR RESEARCH. Applications are invited from medical practitioners for the posts of (*a*) SENIOR RESEARCH OFFICER and (*b*) MEDICAL RESEARCH OFFICER to join a team working on the pathogenesis and treatment of high blood-pressure and other circulatory problems. The successful applicants will be attached to the Department of Medicine, Otago University, New Zealand, and will have the opportunity of seeing patients in the Dunedin Hospital and will work in the Cardiovascular and Hypertensive Outpatient Departments. The clinical and experimental facilities are adequate and further details of the post can be obtained from the undersigned * or from the Secretary, Association of Universities of the British Commonwealth, 36, Gordon-square, London, W.C.1. The salary for (*a*) Senior Research Officer is now £1352 8s., rising to £1652 8s., at which point there is a promotion bar. The salary for (*b*) Medical Research Officer is £752 8s., rising to £1267 8s. (at which point salary increases depend upon promotion to rank of Senior Research Officer). The initial salary depends on the qualifications and experience of the applicant.

Applicants should state their age, nationality, qualifications, publications and academic and clinical experience, and a photograph should be sent. The names of 3 referees should be given. Applications should be sent by air-mail to * Prof. F. H. SMIRK, Chairman of the Clinical Research Committee, Medical School, Dunedin, New Zealand.

ST. VINCENT'S HOSPITAL CLINICAL SCHOOL. UNIVERSITY OF MELBOURNE. Applications are called for the position of the JOHN HOLT DIRECTOR OF BIOCHEMICAL RESEARCH in the St. Vincent's Hospital School of Medical Research. The successful applicant will be in full charge of the Biochemical Research work but would merely have supervisory control over the hospital's routine Biochemical Department. The research laboratories have been newly built and occupy approximately 4500 square feet. Adequate funds are available for equipment. Initially the department staff will comprise the Director, 2 Assistant Biochemists and 2 Technicians. The assistant staff will be appointed on the advice of the Director. Study leave will be granted after a period of 5 years service. A limited amount of money for the attendance at important scientific meetings will be available. Salary is £3000 a year Australian currency; superannuation according to F.S.S.U. Reasonable travelling expenses to Melbourne will be paid for successful applicant and family. Assistance will be given in finding suitable accommodation. Further details and plans of the laboratories may be seen at the office of the Secretary of the Association of the Universities of the British Commonwealth, Gordon-square, London, W.C.1, or at St. Vincent's Hospital.

Closing date for applications 20th August. Arrangements will be made to interview selected overseas applicants in London between 23rd and 30th August.

E. W. R. GRACE, Chief Executive Officer and Secretary.

Hospital Services: Senior Appointments

ST. THOMAS'S HOSPITAL, London, S.E.1. Physician to the Department of Venereal Diseases. Consultant status, with membership of the Medical Committee, and responsibility for the Department. 5 sessions per week. Vacant April, 1956.

Applications (12 copies), naming 3 referees, to the Clerk of the Governors by 20th August.

ST. THOMAS'S HOSPITAL, London, S.E.1. Anæsthetist. Consultant status, with membership of the Medical Committee. 6 sessions per week. Vacant 1st November, 1955.

Applications (12 copies), naming 3 referees, to the Clerk of the Governors by 20th August.

THE HOSPITAL FOR SICK CHILDREN, Great Ormond-street, London, W.C.1. Applications are invited for the appointment of a PHYSICIAN to take charge of the new Electroencephalographic Department to be opened later in the year. The post is of Consultant status, the successful candidate being required to attend 2 sessions per week.

Further particulars and forms of application, which must be returned by 22nd August, 1955, may be obtained from the undersigned.

H. F. RUTHERFORD, House Governor and Secretary.

BIRMINGHAM REGICNAL HOSPITAL BOARD.

Wolverhampton Group

Part-time CONSULTANT PHYSICIAN (3 notional half-days weekly). Duties at Royal Hospital, Wolverhampton (2 notional half-days) and New Cross Hospital (1 notional half-day). Wide experience specialty with special experience diabetes and higher qualification essential.

Coventry Group

Part-time CONSULTANT PHYSICIAN (9 notional half-days weekly). Duties at Coventry and Warwickshire and Gulson Hospitals, Coventry (7 notional half-days), George Eliot and Manor Hospitals, Nuneaton (2 notional half-days). Experience cardiology and higher qualification required.

United Birmingham Hospitals

Part-time CONSULTANT RADIOLOGIST, joint appointment (9 notional half-days weekly). Duties in United Birmingham Hospitals (4 notional half-days), Birmingham (Selly Oak) Group, Royal Orthopædic (336 Beds) and Accident Hospitals (215 Beds) Birmingham (5 notional half-days). Wide experience specialty and higher qualification required.

Applications (15 copies), stating name, age, nationality, qualifications, present and previous appointments, details of 3 referees, to Secretary, 10, Augustus-road, Birmingham, 15, before 8th August, 1955.

LEEDS REGIONAL HOSPITAL BOARD.

Part-time CONSULTANT ANÆSTHETIST (8 sessions per week) for duties at hospitals in the Huddersfield area. The person appointed to reside in Huddersfield.

Part-time CONSULTANT OBSTETRICIAN AND GYNÆCOLOGIST (7 sessions per week) for duties at hospitals in the Bradford area (main unit St. Luke's Hospital, 112 obstetric and 111 gynæcological beds). The person appointed to reside in or near Bradford.

Whole-time ASSISTANT GERIATRICIANS (Senior Hospital Medical Officer scale) for duties at hospitals in the following areas:—

(1) Leeds A and B Groups (933 Beds).
(2) Bradford A and B Groups (728 Beds).

The successful candidates will work in collaboration with the Consultant Geriatricians, and will be required to reside in or near Leeds and Bradford respectively. In the case of both appointments there is an organised Area Geriatric Service.

Whole-time ASSISTANT RADIOLOGIST (Senior Hospital Medical Officer scale) for duties at hospitals in the Hull A, Hull B and East Riding Hospital Management Committee Groups. Applicants should have had wide experience in radiology, and the possession of the D.M.R. is essential. The successful candidate will work under the general guidance of the Consultant in charge of the Department, and will be required to reside in or near Hull.

Applications (12 copies), stating age, qualifications and details of present and previous appointments with dates, together with the names of 3 referees, to the Secretary, Park-parade, Harrogate, not later than 20th August, 1955.

MANCHESTER REGIONAL HOSPITAL BOARD.

(*a*) Whole-time CONSULTANT GROUP PATHOLOGIST, Rochdale and District Hospitals (laboratories at Birch Hill Hospital, Rochdale, and Rochdale Infirmary). Good training and experience in all branches of hospital pathology essential. 2nd August, 1955.

(*b*) CONSULTANT TRAUMATIC AND ORTHOPÆDIC SURGEON (8 notional half-days) mainly for Altrincham General Hospital but with duties also at Withington and Wythenshawe Hospitals, Manchester. Wide experience, higher qualifications essential; appointee to live in or near Altrincham. 2nd August, 1955.

(*c*) CONSULTANT E.N.T. SURGEON to the Burnley and District Group of hospitals (Burnley General, Victoria and Reedyford Hospitals, &c.) whole-time or if maximum part-time, to devote substantially whole-time to appointment. Wide experience and higher qualifications essential; appointee to live in or near Burnley. 9th August, 1955.

Application forms from the Senior Administrative Medical Officer to the Board, Cheetwood-road, Manchester, 8, to be returned by dates stated.

MANCHESTER REGIONAL HOSPITAL BOARD. Whole-time Locum ANÆSTHETIST (Senior Hospital Medical Officer) required for the Rochdale Group of hospitals. Resident or non-resident. Salary 31½ guineas per week.

Apply at once to Group Secretary, Central Offices, Birch Hill Hospital, Rochdale.

NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD.

ASSISTANT PSYCHIATRIST (whole-time), Senior Hospital Medical Officer grade, Shenley Hospital, near St. Albans (2270 Beds). Hospital may be visited by direct appointment.

Application forms obtainable from, and returnable to, Secretary, North West Metropolitan Regional Hospital Board, 11A, Portland-place, W.1, by 22nd August, 1955.

NEWCASTLE REGIONAL HOSPITAL BOARD. South EAST NORTHUMBERLAND HOSPITAL MANAGEMENT COMMITTEE. Locum CONSULTANT GENERAL SURGEON from 20th August to 16th September, 1955.

Applications, with names and addresses of 3 referees, to Senior Administrative Medical Officer, "Blythswood South," Osborne-road, Newcastle upon Tyne, 2, immediately.

NEWCASTLE REGIONAL HOSPITAL BOARD. SUNDERLAND AND HARTLEPOOLS HOSPITALS MANAGEMENT COMMITTEES. (Population: Sunderland 357,699; Hartlepools 130,891.) (Main Hospitals: Sunderland Eye Infirmary 60 Beds; Sunderland Royal Infirmary 300 Beds; Sunderland General Hospital 500 Beds; Hartlepools General Hospital 460 Beds; Hartlepools Hospital 130 Beds.) ASSISTANT OPHTHALMOLOGIST (Senior Hospital Medical Officer) whole-time, or part-time, for minimum of 9 notional half-days per week. Appointee required to reside in Sunderland Group area. Further particulars obtainable from Senior Eye Surgeon, Clinic No. 1, Sunderland Eye Infirmary.

Applications, with names and addresses of 3 referees, to Senior Administrative Medical Officer, "Blythswood South," Osborne-road, Newcastle upon Tyne, 2, within 28 days.

NEWCASTLE. THE UNITED NEWCASTLE UPON TYNE HOSPITALS. NEWCASTLE REGIONAL HOSPITAL BOARD, THE UNIVERSITY OF DURHAM, THE MEDICAL SCHOOL, KING'S COLLEGE. Applications are invited for the post of PHYSICIAN in Neurology at the Royal Victoria Infirmary under the Board of Governors, and at the Newcastle General Hospital under the Regional Hospital Board. The appointee will hold a Lectureship in clinical medicine (neurology) with King's College in the University of Durham. The Board of Governors of the Teaching Hospital are establishing a Neurological Unit in medicine and surgery jointly at the Royal Victoria Infirmary and this unit will have association with the Neurosurgical Unit at the Newcastle General Hospital. The appointment will be of Consultant status and will be full-time or maximum part-time. The major number of sessions will be at the Teaching Hospital and the remainder at the Newcastle General Hospital.

Further particulars may be obtained from the undersigned to whom applications, giving full details and names and addresses of 3 referees, should be sent within 2 weeks of the appearance of this advertisement.

A. W. SANDERSON, House Governor and Secretary.
Royal Victoria Infirmary, Newcastle upon Tyne.

EAST ANGLIAN REGIONAL HOSPITAL BOARD. ASSISTANT RADIOLOGIST (whole-time) Norfolk and Norwich Hospital (441 Beds). The department is the centre for Consultant Radiological services to hospitals in Norwich, Cromer, Gt. Yarmouth and Norfolk. Wide experience and higher qualification necessary. Salary scale £1500–£1950.

Applications (8 copies), stating age, experience and names of 3 referees, to Secretary of Board, 117, Chesterton-road, Cambridge, by 8th August, 1955. Candidates invited to visit hospitals concerned by direct arrangement with Hospital Management Committee Secretary at the Hospital.

SHEFFIELD REGIONAL HOSPITAL BOARD. Whole-time ASSISTANT RADIOLOGIST for Leicester Royal Infirmary and Leicester General Hospital. The successful candidate will work under the direction of the Consultant Radiologist in charge and will be required to reside within 10 miles of Leicester Royal Infirmary. Candidates should possess a Diploma in Radiology. Salary scale £1500–£50–£1950.

Application forms and further details from Senior Administrative Medical Officer, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, 10. Forms to be returned by 13th August, 1955.

SHEFFIELD REGIONAL HOSPITAL BOARD. Whole-time CONSULTANT ANÆSTHETIST for the Sheffield No. 1 Hospital Management Committee Group with duties mainly at the City General Hospital, Sheffield. This hospital has teaching affiliations with the University of Sheffield. There are Professorial Medical and Gynæcological Units, a Department of Thoracic Surgery and a Regional Cardiological Centre.

Further details and application forms from the Senior Administrative Medical Officer, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield. Forms to be returned by 20th August, 1955.

SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited by the Board for the whole-time appointment of an ASSISTANT SENIOR MEDICAL OFFICER on the salary scale £1500–£75 (4)–£100 (1)–£1900. The successful candidate will be required to assist the Board's Senior Administrative Medical Officer in the medical administration of the hospital and specialist services of the Region and to live within reasonable distance of Winchester. Candidates should have had hospital and administrative experience in a senior capacity. The appointment is subject to the provisions of the National Health Service (Superannuation) Regulations, 1950, and may be terminated by 3 months notice on either side. The successful candidate will be required to pass a medical examination.

Applications (2 copies), stating date of birth, qualifications, experience and present appointment(s) and giving the names and addresses of 3 referees, should be made by letter and sent to the undersigned to arrive not later than 13th August, 1955.

E. G. BRAITHWAITE, Secretary of the Board.
11A, Portland-place, London, W.1.

SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD requires Part-time CONSULTANT THORACIC SURGEON (5 half-days per week) for the Godalming, Milford and Liphook (Surrey) Group of sanatoria, comprising a total of 585 Beds for pulmonary tuberculosis, including beds for thoracic surgery for both tuberculosis and non-tuberculosis chest conditions at Milford Chest Hospital and King George V Chest Hospital, Godalming. Applicants must possess a higher surgical qualification and have wide experience in thoracic surgery. Successful candidate will be required to live within reasonable distance of the hospitals.

Applications (5 copies), giving date of birth, qualifications, experience, and names of 3 referees, to Secretary (S.1), South West Metropolitan Regional Hospital Board, 11A, Portland-place, W.1, by 20th August, 1955. Applicants may visit Group by local arrangement.

SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD requires Whole-time RESIDENT MEDICAL DIRECTOR AND CONSULTANT PSYCHIATRIST at Roffey Park Rehabilitation Centre, Horsham, Sussex, a neurosis centre with 120 Beds and a turnover of 800 cases per year. Candidates should possess D.P.M. and preferably a higher medical qualification and should have had wide experience in psychiatry and in modern methods of treatment. Experience of social and/or industrial psychiatry would be an advantage. Scope for teaching social psychiatry in the associated Institute. Flat within Hospital building at moderate rental.

Applications (5 copies), giving date of birth, qualifications, experience, and names of 3 referees, to Secretary (S.1), South West Metropolitan Regional Hospital Board, 11A, Portland-place, W.1, by 20th August, 1955. Applicants may visit Centre by local arrangement.

DUBLIN. NATIONAL MASS-RADIOGRAPHY ASSOCIATION LIMITED. Appointment of 2 ASSISTANT MEDICAL DIRECTORS.

Salary: £1200 p.a.

Essential qualifications: Candidates must be registered practitioners and possess the D.M.R. or the D.M.R.E.

Duties: To interpret 70-mm. miniature X-ray films.

The appointment will be whole-time and temporary. Selected candidates will be employed at the Association's headquarters in Dublin, and will be expected to take up duty on 1st September, 1955.

Further particulars and application forms may be obtained from the Secretary, National Mass-Radiography Association Limited, 37/39, Tara-street, Dublin.

Hospital Services: Junior Appointments

BROMPTON HOSPITAL, S.W.3. Applications are invited for the following posts:—

ASSISTANT RESIDENT MEDICAL OFFICER (Senior House Officer grade). Appointment is for 6 months from 1st October, 1955. Experience in artificial pneumothorax essential and in E.N.T. work desirable. Duties include work in tuberculosis dispensary and wards.

NON-RESIDENT HOUSE PHYSICIAN for which there are 3 vacancies, for 6 months from 1st October, 1955. Duties include work in Outpatient Department and wards. Salary at the rate of £525 p.a.

Applications, stating age, qualifications with dates, nationality and appointments held, together with copies of testimonials, by 6th August, to—

KENNETH A. F. MILES, House Governor.

CENTRAL MIDDLESEX HOSPITAL, N.W.10. North WEST METROPOLITAN REGIONAL HOSPITAL BOARD. SENIOR REGISTRAR AND FIRST ASSISTANT (Department of Anæsthetics). Possession of F.F.A.R.C.S. essential. Whole-time, non-resident except when on duty. Duties may include undergraduate teaching. There is a regional training scheme which provides facilities, at regional centres, for gaining experience in specialist techniques in plastic and thoracic anæsthesia. Applicants may visit Hospital by direct appointment.

Application forms obtainable from, and returnable to, Group Secretary, Central Middlesex Hospital Management Committee, Park Royal, N.W.10, by 6th August, 1955.

CENTRAL MIDDLESEX HOSPITAL, Park Royal, N.W.10. RESIDENT HOUSE OFFICER required in General Surgical and Urological Department. Pre-registration appointment for 6 months from 1st September, 1955.

Applications, with copies of 2 testimonials, to Medical Director by 30th July, 1955.

CHILDREN'S HOSPITAL, Sydenham, S.E.26. House OFFICER (medicine and surgery) required 1st September, 1955. Post recognised for D.C.H.

Apply, naming 2 referees, to the Administrative Officer, by 4th August.

CONNAUGHT HOSPITAL, Walthamstow, E.17. (118 Beds.) Applications are invited for the post of CASUALTY OFFICER AND DEPUTY RESIDENT SURGICAL OFFICER, graded as Senior House Officer, vacant 25th August, 1955. Recognised for F.R.C.S. Salary £745 p.a., less £150 p.a. for board, lodging, &c.

Applications, with full details and copies of 2 recent testimonials, should be sent immediately to Secretary, Hospital Management Committee, Forest Group, Langthorne-road, E.11.

DULWICH HOSPITAL, East Dulwich-grove, S.E.22. CAMBERWELL HOSPITAL MANAGEMENT COMMITTEE. Applications invited for appointment as HOUSE OFFICER (general surgical duties), vacant from 16th August, 1955. Recognised pre-registration post. There is an association with King's College Hospital Medical School for the teaching of medical students.

Applications, stating age, qualifications and previous positions (if any) with copy testimonials or names of 2 referees, to the Group Secretary, Camberwell Hospital Management Committee, Dulwich Hospital, not later than 4th August, 1955.

HAMMERSMITH HOSPITAL AND INSTITUTES OF OBSTETRICS AND CHILD HEALTH, Ducane-road, London, W.12. Locum PÆDIATRIC REGISTRAR (resident) required 2nd–18th September. Duties involve care of newborn babies in Maternity Department and Premature Baby Unit.

Applications, stating age, qualifications, experience, copies of 2 recent testimonials, to Secretary, Board of Governors, by 2nd August.

HACKNEY HOSPITAL, London, E.9. (General—844 Beds.) Applications are invited for the post of SENIOR HOUSE OFFICER ANÆSTHETIST. The post (now vacant) is recognised for the D.A. and F.F.A.R.C.S. examination and offers wide experience of anæsthesia and opportunities for studying for higher qualifications.

Apply immediately to Group Secretary, above address, quoting HH/SHOA.

HACKNEY HOSPITAL, London, E.9. (General—844 Beds.) Applications for the 12 months resident appointment of CASUALTY OFFICER (Senior House Officer grade), from 1st September, should reach the Secretary, above address, by 12th August, quoting HH SCO.

HACKNEY HOSPITAL, London, E.9. (General—844 Beds.) Applications are invited for 12 months appointment from early August as SENIOR HOUSE OFFICER (obstetrics and gynæcology). Post recognised for M.R.C.O.G.

Apply, with copy testimonials, to Group Secretary, above address, by 30th July, quoting HH/SHO.

HOSPITALS FOR DISEASES OF THE CHEST, London CHEST HOSPITAL, E.2. Applications are invited for the post of REGISTRAR in Anæsthetics (recognised for F.F.A.R.C.S.). The post is a whole-time one, non-resident, and tenable in the first instance for 1 year from 1st October, 1955. Duties include attendance at the Country Branch, near Letchworth, Herts.

Applications, stating date of birth, qualifications with dates, previous appointments held, and accompanied by copies of 3 testimonials, should reach the undersigned by 20th August, 1955. THOMAS BROWN, House Governor.

London Chest Hospital, E.2.

KING EDWARD MEMORIAL HOSPITAL Ealing; PERIVALE MATERNITY HOSPITAL, GREENFORD. SOUTH WEST MIDDLESEX HOSPITAL MANAGEMENT COMMITTEE. REGISTRAR (whole-time) in Obstetrics and Gynæcology required for duty at King Edward Memorial Hospital, Ealing (17 gynæcological beds), Perivale Maternity Hospital, Greenford (50 obstetric beds). Recognised in obstetrics by the Royal College of Obstetricians and Gynæcologists for the Membership. Resident at Perivale Maternity Hospital. Vacant 27th August, 1955. Candidates may visit hospitals by appointment with Hospital Secretary.

Application forms obtainable from, and returnable to, the Secretary, South West Middlesex Hospital Management Committee, West Middlesex Hospital, Isleworth, by 5th August, 1955.

KING EDWARD MEMORIAL HOSPITAL, Ealing. SOUTH WEST MIDDLESEX HOSPITAL MANAGEMENT COMMITTEE. HOUSE PHYSICIAN, vacant 1st September. Preference given to persons seeking pre-registration post under Medical Act, 1950.

Applications, stating age, nationality, qualifications with dates and details of experience, together with copies of 2 recent testimonials, to Group Secretary, West Middlesex Hospital, Isleworth, Middlesex, by 8th August, 1955.

KING EDWARD MEMORIAL HOSPITAL, Ealing. SOUTH WEST MIDDLESEX HOSPITAL MANAGEMENT COMMITTEE. HOUSE OFFICER to General Surgeon, vacant 1st September, 1955. Preference given to persons seeking pre-registration posts.

Applications, stating age, nationality, qualifications with dates and details of experience, together with copies of 2 recent testimonials, to Group Secretary, West Middlesex Hospital, Isleworth, by 4th August, 1955.

LONDON JEWISH HOSPITAL, Stepney Green, London E.1. (130 Beds.) HOUSE PHYSICIAN (pre- or post-registration) required for 6 months commencing 3rd August, 1955.

Applications, with copies of testimonials, to be sent to the Hospital Secretary.

MILE END HOSPITAL, Bancroft-road, E.1. (475 Beds.) HOUSE SURGEONS (pre- or post-registration):—

(i) Post vacant immediately.

(ii) Post vacant 25th August, 1955.

Application forms obtainable from Physician-Superintendent, to be returned by 5th August, 1955, with copies of not more than 3 testimonials.

MOTHERS' HOSPITAL (Salvation Army), London, E.5. (Maternity—110 Beds.) OBSTETRIC HOUSE SURGEONS required as under:—

(*a*) from 1st September (pre-registration).

(*b*) from 1st September (registered).

The 6-month appointments are recognised for the M.R.C.O.G.

Apply Group Secretary, Hackney Hospital, London, E.9, quoting MH/HO.

NATIONAL HOSPITALS FOR NERVOUS DISEASES. Applications invited for appointment of MEDICAL REGISTRAR (non-resident) at Maida Vale Hospital for Nervous Diseases, London, W.9. Applications are invited for the above full-time appointment; grading as Senior Registrar. Preference will be given to a candidate holding a higher degree who intends to specialise in neurology.

Applications, with copies of 3 recent testimonials, to be sent to the Secretary at Maida Vale Hospital not later than 6th August, 1955.

NATIONAL HOSPITALS FOR NERVOUS DISEASES. Applications are invited from registered medical practitioners for the appointment of HOUSE PHYSICIAN at The National Hospital, Queen-square, W.C.1. This post carries the grade of Registrar. The appointment will be for 1 year and will be renewed in exceptional circumstances.

Applications, with names of 3 referees, to be sent to the undersigned not later than 20th August, 1955.

H. EWART MITCHELL, Secretary to the Board of Governors.

The National Hospital, Queen-square, W.C.1.

PADDINGTON GREEN CHILDREN'S HOSPITAL. (St. MARY'S HOSPITAL, W.2.) Applications are invited for the post of CLINICAL ASSISTANT to the Medical Outpatient Department (Senior Registrar status) for 2 notional half-days per week for a period of 12 months as from a date to be arranged. The appointment is subject to annual review. Higher qualification essential. Candidates should have had experience in pædiatrics and psychiatry.

Applications, stating age, nationality, qualifications with dates, present Hospital Service grading, together with details of previous experience, and names of 3 referees, should be sent to the Secretary not later than 30th July, 1955.

NORTH MIDDLESEX HOSPITAL, Edmonton, N.18. 2 RESIDENT HOUSE PHYSICIANS required for 1st September. General medicine. Approved as pre-registration posts (first or second). 6 months appointment.

Applications, stating age, qualifications, experience, nationality, with copies of recent testimonials, to Secretary of Hospital, by 2nd August.

QUEEN MARY'S HOSPITAL FOR THE EAST END, Stratford, E.15. SENIOR OBSTETRIC HOUSE SURGEON (Male or Female—Senior House Officer grade) required for 6 months commencing 27th August, 1955. Post recognised for M.R.C.O.G.

Applications, with copies of recent testimonials; to Group Secretary, West Ham Group Hospital Management Committee, Stratford, London, E.15, by 31st July, 1955.

QUEEN MARY'S HOSPITAL FOR THE EAST END, Stratford, London, E.15. OBSTETRIC HOUSE SURGEON (Male or Female—House Officer, third post) required for 6 months commencing 27th August, 1955. The successful candidate may be eligible for appointment as Senior Obstetric House Officer (Senior House Officer grade) for the ensuing 6 months. Post recognised for M.R.C.O.G.

Applications, with copies of recent testimonials, to Group Secretary, West Ham Group Hospital Management Committee, Stratford, E.15, by 31st July, 1955.

ROYAL FREE HOSPITAL. Applications are invited from registered medical practitioners for the post of SENIOR CASUALTY OFFICER at the Royal Free Hospital, Gray's Inn-road, W.C.1. The appointment is full-time, resident for 6 months; duties to commence on 1st October, 1955. Salary and conditions of service in accordance with those laid down by the Ministry of Health for Senior House Officers.

Application forms may be obtained from the Secretary to the Board of Governors, Royal Free Hospital, Gray's Inn-road, W.C.1, to whom they should be returned not later than 29th July, 1955.

ROYAL NATIONAL ORTHOPÆDIC HOSPITAL, 234, Great Portland-street, London, W.1. Applications are invited for the appointment of ORTHOPÆDIC REGISTRAR (full-time), non-resident. Preference will be given to candidates with a higher surgical qualification. Duties to commence 1st November.

Applications to be received not later than 14th August. Forms of application can be obtained from the House Governor at 234, Great Portland-street, London, W.1.

ST. GEORGE-IN-THE-EAST HOSPITAL, Raine-street, Wapping, E.1. Applications are invited for the post of HOUSE SURGEON (pre- or post-registration). Post vacant 10th August, 1955. Tenable for 6 months. Salary, &c., in accordance with national scale.

Applications, stating age, nationality, qualifications and experience, together with copies of 3 recent testimonials, to be forwarded to the Medical Superintendent.

ST. GEORGE-IN-THE-EAST HOSPITAL, Raine-street, Wapping, E.1. Applications are invited for the post of CASUALTY OFFICER (Senior House Officer), resident or non-resident. (9 A.M.–5 P.M. Monday–Friday: 9 A.M.–1 P.M. Saturday). Tenable for 1 year. Salary, &c., in accordance with national scale

Application forms obtainable from, and returnable to, the Medical Superintendent.

ST. GEORGE'S HOSPITAL, S.W.1. Applications are invited for the post of REGISTRAR to the Department of Psychiatry. The inpatient work of the Department is at the Atkinson Morley Hospital, and the outpatient work at St. George's. The appointment is for 1 year in the first instance, and the successful candidate will be required to take up duty on 1st October, 1955.

Applications, stating age, education, qualifications, experience, and the names of 2 referees, should reach the undersigned not later than 20th August, 1955.

P. H. CONSTABLE, House Governor.

ST. GEORGE'S HOSPITAL, S.W.1. Applications are invited for the post of SENIOR REGISTRAR to the Department of Anæsthetics. Candidates should hold the Fellowship of the Faculty of Anæsthetists. This is a full-time appointment, non-resident except for certain emergency duties, and the successful candidate will be required to take up duty on 24th October, 1955.

Applications, stating age, education, qualifications, experience, and the names of 2 referees, should reach the undersigned not later than 13th August, 1955

P. H. CONSTABLE, House Governor.

ST. MARY'S HOSPITAL, W.2. Applications are invited from suitably qualified practitioners, for the post of NON-RESIDENT CASUALTY SURGEON. Candidates must have held an appointment as House Surgeon at this Hospital or at another hospital approved by the Board of Governors. The appointment is for a first period of 6 months with effect from 1st September, 1955; remuneration to be at Senior House Officer rate.

Applications, stating nationality, date of birth, permanent address, qualifications with dates, details and National Health Service gradings of previous and present appointments, together with the names and addresses of 3 referees, should reach ALAN POWDITCH, House Governor, not later than 3rd August, 1955.

ST. MARYLEBONE HOSPITAL FOR PSYCHIATRY AND CHILD GUIDANCE, 48, Cosway-street, N.W.1. Applications are invited for the post of REGISTRAR in the Child Guidance Department for 1 session per week commencing early in September. Applicants should have had previous experience in child guidance.

Application forms obtainable from, and returnable to, Secretary, Paddington Group Hospital Management Committee, Harrow-road, W.9, by 8th August, 1955.

ST. BENEDICT'S HOSPITAL, Church-lane, Tooting, S.W.17. SENIOR HOUSE OFFICER for duties in Chronic Sick and Rehabilitation Unit. Ample time for postgraduate study. Post vacant now.

Applications, stating age, qualifications, experience, and names of 2 referees, to Group Secretary, Wandsworth Hospital Group, St. James Hospital, Balham, S.W.12, by 29th July.

SOUTH EAST REGIONAL THORACIC SURGERY UNIT (46 Beds), BROOK GENERAL HOSPITAL, Shooters Hill-road, S.E.18. SENIOR HOUSE OFFICER. Recognised for F.R.C.S. 6 months appointment and may be renewed for a further period. The Unit treats all types of chest diseases and offers opportunity for comprehensive training in thoracic surgery.

Apply to Group Secretary, Memorial Hospital, Woolwich, S.E.18.

THORPE COOMBE MATERNITY HOSPITAL, Walthamstow, E.17. (58 Beds.) Applications are invited from medical Women for the post of JUNIOR OBSTETRIC OFFICER (graded House Officer), vacant 31st August, 1955. The Hospital is recognised by the Royal College of Obstetricians and Gynæcologists.

Applications, with full details and copies of 2 recent testimonials, should be sent immediately to Secretary, Hospital Management Committee, Forest Group, Langthorne-road, E.11.

WANSTEAD HOSPITAL, Hermon Hill, London, E.11. (191 Beds.) HOUSE SURGEON required. Post vacant now. Recognised for F.R.C.S.

Applications, with full details and copies of 2 recent testimonials, should be sent immediately to Secretary, Forest Group Hospital Management Committee, Langthorne-road, E.11.

WANSTEAD HOSPITAL, Hermon Hill, E.11. (191 Beds.) Applications are invited for the post of CASUALTY OFFICER, recognised for F.R.C.S. Graded Senior House Officer. Salary £745 p.a., less £150 p.a. for board, lodging, &c.

Applications, with full details and copies of 2 recent testimonials, should be sent immediately to the Secretary, Forest Group Hospital Management Committee, Langthorne-road, E.11.

WANSTEAD HOSPITAL, Hermon Hill, E.11. (191 Beds.) Applications are invited for the post of OBSTETRIC AND GYNÆCOLOGICAL HOUSE SURGEON, vacant 26th August, 1955. The appointment is recognised for the D.Obst.R.C.O.G.

Applications, with full details and copies of 2 recent testimonials, should be sent immediately to the Secretary, Forest Group Hospital Management Committee, Langthorne-road, E.11.

WILLESDEN GENERAL HOSPITAL, Harlesden-road, N.W.10. RESIDENT CASUALTY OFFICER (Senior House Officer grade) required 31st August. 6 months appointment. Post recognised under Fellowship regulations. £170 p.a. deduction for residence.

Applications, with names of 2 referees, to Hospital Secretary, by 3rd August, 1955.

ABERYSTWYTH GENERAL HOSPITAL. Mid Wales HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of SENIOR HOUSE OFFICER at the above Hospital. Post recognised for F.R.C.S. Vacant on 1st August, 1955. The post is resident.

Applications, stating age, nationality, qualifications, and experience, accompanied by copies of 2 recent testimonials, should be sent to the Group Secretary, "Orlandon," North-parade, Aberystwyth, within 14 days from the publication of this advertisement.

ASHFORD HOSPITAL, Ashford, Middlesex. Staines GROUP HOSPITAL MANAGEMENT COMMITTEE. Required, RESIDENT HOUSE OFFICER (Male) for special departments (E.N.T., pædiatrics, ophthalmology, dermatology, &c.). 6 months appointment, vacant after 17th August, 1955. Not suitable for pre-registration candidates.

Applications, stating age, qualifications and experience, with copies of up to 3 recent testimonials, to Medical Director of Hospital.

BEDFORD GENERAL HOSPITAL. (437 Beds.) Locum CASUALTY OFFICER (Registrar grade) required pending permanent appointment. Salary £17 10s. per week.

Applications, stating age, nationality, qualifications, and previous appointments, together with copies of 2 recent testimonials, should be forwarded to Group Secretary, Bedford Group Hospital Management Committee, 3, Kimbolton-road, Bedford.

BEDFORD GENERAL HOSPITAL. (437 Beds.) Locum ORTHOPÆDIC REGISTRAR required 3rd–30th August. Salary £17 10s. per week.

Applications, stating age, nationality, qualifications, and previous appointments, together with copies of 2 recent testimonials, should be forwarded to Group Secretary, Bedford Group Hospital Management Committee, 3, Kimbolton-road, Bedford.

BEXHILL HOSPITAL, Bexhill. (62 Beds.) 2 Resident HOUSE SURGEONS required. 1 pre-registration. Posts vacant 1st August. National scale of salary.

Apply to Hospital Administrator.

BARNSTAPLE. NORTH DEVON INFIRMARY. (110 Beds.) HOUSE SURGEON (pre-registration). Post vacant mid-July.

Applications to Group Secretary, North Devon Hospital Management Committee, 19, Alexandra-road, Barnstaple.

BATLEY. THE GENERAL HOSPITAL, Carlinghow HILL, BATLEY, YORKS.

HOUSE SURGEON (surgery and E.N.T.).

HOUSE SURGEON (orthopædic and ophthalmology).

Both these appointments are pre-registration posts, but consideration will be given to Locum applications. The posts can be taken up immediately.

Applications in writing, enclosing testimonials, should be sent to the Administrative Officer at the Hospital.

BANGOR. ST. DAVID'S HOSPITAL. (Specialist Hospital for Women and Children.) CAERNARVON AND ANGLESEY HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of RESIDENT PÆDIATRIC OFFICER (Senior House Officer grade). Preference will be given to candidates with previous experience in neonatal and premature infant care. The Pædiatric Unit is recognised for the D.C.H. Salary according to scale.

Applications, stating age, qualifications and experience, together with the names and addresses of 2 referees, should be forwarded within 10 days of the appearance of this advertisement to the Group Secretary, Plas Gwyn, Ffriddoedd-road, Bangor, North Wales.

BARRY ACCIDENT AND SURGICAL HOSPITAL. CARDIFF HOSPITAL MANAGEMENT COMMITTEE. SENIOR HOUSE OFFICER required immediately at above Hospital. Staffed by whole-time Consultant Surgeon and Senior Casualty Officer. Excellent experience given in general surgery.

Form of application from Group Secretary, Cardiff Hospita Management Committee, 44, Cathedral-road, Cardiff.

BOURNEMOUTH. ROYAL VICTORIA HOSPITAL. (494 Beds.) **BOURNEMOUTH AND EAST DORSET HOSPITAL MANAGEMENT COMMITTEE.** Applications are invited for the post of a SENIOR HOUSE OFFICER (resident), orthopædic and casualty combined. The post which becomes vacant immediately is recognised for the F.R.C.S. examination and is tenable for 12 months.

Applications to the Deputy Hospital Secretary.

BOURNEMOUTH AND EAST DORSET HOSPITAL MANAGEMENT COMMITTEE. POOLE GENERAL AND ALDERNEY I.D. HOSPITALS, DORSET. HOUSE PHYSICIAN required for post becoming vacant on 31st August, 1955. Resident at the Alderney Hospital, Parkstone.

Applications, with testimonials, to the Hospital Secretary, Poole General Hospital.

BIRMINGHAM REGIONAL HOSPITAL BOARD.

(1) **Birmingham (Dudley Road) Group, Dudley Road Hospital, Birmingham, 18**

(*a*) REGISTRAR in E.N.T. Surgery for Birmingham and Midland Ear and Throat Hospital. Resident. Recognised for D.L.O. and F.R.C.S.

(*b*) SURGICAL REGISTRAR for Dudley Road Hospital (780 Beds). Considerable experience essential and higher qualifications an advantage. Excellent opportunities for wide range of experience.

(2) **Birmingham (Selly Oak) Group, Oak Tree-lane, Birmingham, 29**

(*a*) REGISTRAR in Pathology for Birmingham Accident Hospital. Previous experience essential. Higher qualification desirable. Experience available in hæmatology including blood transfusion, bacteriology, biochemistry and morbid anatomy. Details from Consultant Pathologist.

(*b*) REGISTRAR in General Surgery (resident). Duties at Solihull and Little Bromwich Hospitals. Higher qualification desirable.

(3) **Dudley, Stourbridge Group, The Guest Hospital, Dudley**

REGISTRAR in General Medicine. Duties at Wordsley Hospital (478 Beds). Experience specialty essential; higher qualification desirable. Resident.

(4) **Shrewsbury Group, Royal Salop Infirmary, Shrewsbury**

MEDICAL REGISTRAR (145 acute medical beds). House available.

(5) **Walsall Group, General Hospital, Wednesbury-road, Walsall**

REGISTRAR in General Medicine (resident) for Manor Hospital (333 Beds). Experience specialty essential.

(6) **West Bromwich Group, West Bromwich General Hospital, West Bromwich**

(*a*) REGISTRAR in Pathology. Well-equipped laboratory offering excellent opportunities for comprehensive pathological experience. Recognised for D.Path.

(*b*) REGISTRAR in General Surgery. Duties in Casualty Department. Recognised for F.R.C.S. Opportunity deputise for Resident Surgical Officer in general surgery work. Experience specialty required. Resident.

Application forms from Group Secretaries, to be returned before 8th August, 1955. Candidates may visit hospitals.

BIRMINGHAM. THE UNITED BIRMINGHAM HOSPITALS. Applications are invited for 2 appointments of RESIDENT SENIOR REGISTRAR in Anæsthetics for duties in the United Hospitals. The appointments will be for 1 year in the first instance and subject to annual review. The successful candidates may subsequently be required to spend not more than 2 years in a selected hospital of the Birmingham Regional Hospital Board in accordance with an arrangement for the interchange of Senior Registrars agreed between the 2 Boards. Candidates must possess the 2-Part Diploma in Anæsthetics of the Conjoint Examining Board in England or the Diploma of Fellow of the Faculty of Anæsthetists of the Royal College of Surgeons of England.

Application forms may be obtained from the Secretary, United Birmingham Hospitals, Queen Elizabeth Hospital, Edgbaston, Birmingham, 15, and should be returned to him not later than 13th August, 1955.

BIRMINGHAM. THE UNITED BIRMINGHAM HOSPITALS. GENERAL HOSPITAL. Applications are invited for the post of MEDICAL REGISTRAR (Registrar grade) for duty as Resident Medical Officer. The post is vacant 1st August, 1955, and is tenable for 1 year in the first instance. Candidates must have held a resident appointment and should have the M.R.C.P. (London).

Forms of application may be obtained from, and should be returned as soon as possible to, the Secretary, The United Birmingham Hospitals, Queen Elizabeth Hospital, Birmingham, 15.

BIRMINGHAM. ACCIDENT HOSPITAL, Bath-row, BIRMINGHAM, 15. RESIDENT ANÆSTHETIST (Senior House Officer). There are 3 Consultant Anæsthetists and training is given in modern methods of anæsthesia. Ample opportunity for study. Previous experience not essential.

Applications, with full details naming 2 referees, to Administrator.

BIRMINGHAM AND MIDLAND EAR AND THROAT HOSPITAL, Edmund-street, BIRMINGHAM, 3. HOUSE OFFICER required. Pre-registration considered.

Detailed applications, with copies of 2 recent testimonials, to Secretary, Dudley Road Hospital, Birmingham, 18.

BISHOP AUCKLAND, Co. DURHAM. THE GENERAL HOSPITAL. (350 Beds.) SOUTH WEST DURHAM HOSPITAL MANAGEMENT COMMITTEE. HOUSE SURGEON required. Recognised pre-registration post.

Apply, naming 2 referees, to K. G. T. LUXFORD, Group Secretary, at the above address.

BISHOP'S STORTFORD AND DISTRICT HOSPITAL, Rye-street, BISHOP'S STORTFORD, HERTS. (67 Beds—medical, surgical and maternity. Midway between London and Cambridge. Main Line Railway from Liverpool Street.) Applications are invited from registered medical practitioners for the appointment of RESIDENT SENIOR HOUSE OFFICER. Appointment to commence as soon as possible. Salary £745 p.a.

Applications, stating age, nationality, qualifications and experience, with copies of recent testimonials or names of referees, should be sent to the Hospital Secretary, Haymeads Hospital, Bishop's Stortford, Herts.

BLACKBURN. ROYAL INFIRMARY. (262 acute beds.) BLACKBURN AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE. SENIOR HOUSE OFFICER (general surgery) required end of August at the above Infirmary. Recognised for F.R.C.S.

Apply to Secretary, Hospital Management Committee Office, Royal Infirmary, Blackburn.

BOLTON. THE ROYAL INFIRMARY. (237 Beds.) BOLTON AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE.

RESIDENT SENIOR HOUSE OFFICER in Orthopædic Surgery, vacant August, tenable for 12 months and recognised for F.R.C.S.

RESIDENT HOUSE SURGEON for general surgical duties, vacant 27th August, tenable for 6 months and recognised under the Pre-registration Service Scheme. Also recognised for F.R.C.S.

Applications, stating age, nationality, qualifications, experience, and the names of 2 referees, should be sent immediately to Group Secretary, The Royal Infirmary, Bolton.

BRADFORD. ROYAL EYE AND EAR HOSPITAL. HOUSE SURGEON (ophthalmology), vacant now. Recognised for D.O.M.S. and F.R.C.S. Salary according to Whitley Council (MDB) rates.

Applications, stating age, nationality, qualifications, and experience, with copy testimonials, to Secretary, Bradford Royal Infirmary.

BRADFORD. ST. LUKE'S HOSPITAL. House Surgeon (general) required, vacant 12th August. Recognised for pre-registration purposes and F.R.C.S. Salary £425–£525 p.a., less £125 p.a. residential emoluments.

Applications, stating age, nationality, qualifications, and experience with copy testimonials, to Secretary, Royal Infirmary, Bradford.

BRADFORD. ST. LUKE'S HOSPITAL. Senior House OFFICER (anæsthetics), vacant 8th August. Salary £745 p.a., less £150 p.a. residential emoluments. Opportunities for plastic and intra-thoracic experience and recognised for D.A. and F.F.A.R.C.S.

Applications, stating age, nationality, qualifications, and experience, with copy testimonials, to Secretary, Bradford Royal Infirmary.

BRADFORD. ST. LUKE'S HOSPITAL AND WOOD-LANDS HOSPITAL, RAWDON, near LEEDS. SENIOR HOUSE OFFICER to Orthopædic Unit, with duties at both hospitals, vacant now. Salary £745 p.a., less £150 p.a. residential emoluments.

Applications, stating age, nationality, qualifications and experience with copy testimonials, to the Secretary, Bradford Royal Infirmary.

BRIGHTON. ROYAL ALEXANDRA HOSPITAL FOR SICK CHILDREN, Dyke-road. (129 Beds and Cots.) SENIOR HOUSE OFFICER required commencing 8th September, 1955. Salary at the rate of £745 p.a., less £150 p.a. for residential emoluments. Candidates should have experience in paediatrics (including surgery). The post is recognised for D.C.H.

Applications, stating age, nationality, experience, together with copies of 2 testimonials and the names of 2 referees, should reach the Administrative Officer not later than 30th July, 1955.

BROMLEY HOSPITAL, Bromley, Kent. Senior House OFFICER (in charge Casualty Department) required for 6 months from 1st August, 1955. Recognised for F.R.C.S. Deduction of £150 p.a. for residence.

Apply, stating age, qualifications with dates, previous experience, and naming 3 referees, to Administrative Officer.

BURY AND ROSSENDALE HOSPITAL MANAGEMENT COMMITTEE. BURY GENERAL HOSPITAL, BURY, LANCS. HOUSE OFFICER (surgery) pre-registration appointment. A vacancy exists at the present time.

Apply, stating age, qualifications and experience, to—

H. WILKINSON, Group Secretary.

BURY AND ROSSENDALE HOSPITAL MANAGEMENT COMMITTEE. BURY GENERAL HOSPITAL. CLINICAL PATHOLOGIST (Senior House Officer grade), resident or non-resident, with duties mainly at Bury General Hospital. The post affords opportunities for gaining experience in all branches of pathology.

Apply, stating nationality, qualifications, &c., and names of 2 referees, to H. WILKINSON, Esq., Group Secretary.

Bury General Hospital, Bury, Lancs.

BRISTOL-COSSHAM/FRENCHAY HOSPITAL MAN-AGEMENT COMMITTEE. FRENCHAY HOSPITAL. (513 staffed beds, expanding.) Applications are invited for the post of SENIOR HOUSE OFFICER in the regional Neurosurgery Department. This post offers useful surgical experience and the opportunity of gaining a working knowledge of neurological diagnosis. Recognised for F.R.C.S.

Applications to the Secretary, Frenchay Hospital, quoting "N.S.F." Names of 2 referees required.

BRISTOL. SOUTHMEAD GENERAL HOSPITAL GROUP MANAGEMENT COMMITTEE. Required immediately at Southmead Hospital (571 Beds including 133 maternity) RESIDENT SENIOR HOUSE OFFICER (anæsthetics). Post recognised for F.F.A.R.C.S.

Applications to be made to —

C. C. HANCOCK, Group Secretary.

Southmead Hospital, Bristol.

BRISTOL. WINFORD ORTHOPÆDIC HOSPITAL. (230 Beds.) SENIOR HOUSE OFFICER. Applications are invited from registered medical practitioners for this post becoming vacant end of August. Suitable for candidate reading for higher grade qualification and recognised for F.R.C.S. Hospital is staffed by Consultants of teaching hospital.

Apply, stating age, qualifications and experience with testimonials, to Secretary.

CAMBRIDGE, ADDENBROOKE'S HOSPITAL. Resident ANÆSTHETIC SENIOR HOUSE OFFICER required in a few weeks time for 1 year. Anæsthetic experience essential.

Apply, stating age, nationality, qualifications and experience with dates, and copies of 3 testimonials, to Secretary by 3rd August.

CANTERBURY. KENT AND CANTERBURY HOS-PITAL. (276 Beds.) GYNÆCOLOGICAL HOUSE SURGEON required at Highland Court Annexe, a unit of 25 gynæcological beds situated 3 miles from the above Hospital, with all ancillary services available. Recognised for M.R.C.O.G. 6 months appointment. Post now vacant. National Health Service salary and conditions.

Applications, together with copies of 2 recent testimonials, to be addressed to the Hospital Secretary at the above Hospital.

CANTERBURY. KENT AND CANTERBURY HOS-PITAL. (276 Beds.) PÆDIATRIC HOUSE PHYSICIAN. The post, recognised for D.C.H., includes work in the ward and Outpatient Department and also provides experience in the care of the newborn. Opportunities exist for the study of preventive medicine among children and child guidance work. Post now vacant. National Health Service salary and conditions.

Applications, together with 2 testimonials, to be addressed to the Hospital Secretary at the above Hospital.

CARLISLE. CUMBERLAND INFIRMARY. Applications are invited for 2 HOUSE OFFICER appointments—General Surgery, for the 6 months period commencing 1st August, 1955. The posts are recognised for pre-registration purposes and for the F.R.C.S. examination.

Applications, stating age, giving details of education, training and experience, together with the names of 2 referees, should be sent to the Secretary, Cumberland Infirmary, Carlisle, as soon as possible.

CHICHESTER. ROYAL WEST SUSSEX HOSPITAL. (202 acute beds.) SENIOR HOUSE SURGEON (Deputy Resident Surgical Officer) required at above Hospital. Post recognised for F.R.C.S. Resident staff of 6—Resident Surgical Officer, 3 House Surgeons, Resident Medical Officer and House Physician. Salary £745 p.a., less residential charge. Vacant early August.

Applications, stating age, experience, qualifications with references or names of referees, to Senior Administrative Officer.

CHERTSEY, SURREY. ST. PETER'S HOSPITAL (late Botley's Park War Hospital). (430 Beds.) SENIOR HOUSE OFFICER ANÆSTHETIST required. Appointment recognised for D.A. and F.F.A.R.C.S. Duties to commence second week in August. Salary in accordance with terms and conditions of National Health Service.

Applications, together with names and addresses of referees, to be sent to the Physician-Superintendent, St. Peter's Hospital, as soon as possible.

CHELMSFORD HOSPITAL MANAGEMENT COM-MITTEE. Resident Locum Tenens REGISTRAR to the Department of Pathology in Chelmsford from the middle of August. Previous experience in pathology essential. Higher qualifications not necessary.

Apply Secretary, Chelmsford Hospital Management Committee, London-road, Chelmsford.

CHELMSFORD. ST. JOHN'S HOSPITAL. (70 surgical beds.) Applications are invited for the appointment of RESIDENT SURGICAL OFFICER (Senior House Officer grade) at above Hospital. The post which becomes vacant on 1st September, 1955, is recognised for the F.R.C.S. and the successful candidate will gain excellent practical experience in general surgery, with good opportunity for preparation for higher qualifications. A House Surgeon is in residence.

Applications, stating age, nationality, present appointment and previous appointments, both with dates, together with the names and addresses of 2 referees, to be sent to the Group Secretary, Chelmsford Hospital Management Committee, Chelmsford and Essex Hospital, London-road, Chelmsford.

CHELTENHAM GROUP HOSPITAL MANAGEMENT COMMITTEE. Applications are invited from Male and Female practitioners for the appointment of SENIOR HOUSE OFFICER ANÆSTHETIST which will be vacant at the beginning of September. Salary and conditions of service in accordance with Whitley Council regulations.

Applications, with names of referees and full details, to—

STANLEY T. DAVIS, Group Secretary.

General Hospital, Cheltenham.

CHELTENHAM MATERNITY HOSPITAL. Cheltenham GROUP HOSPITAL MANAGEMENT COMMITTEE. Applications are invited from registered medical practitioners for the appointment of RESIDENT OBSTETRIC OFFICER. The Hospital which is recognised for the purpose of training for the D.Obst.R.C.O.G., has 50 beds and deals with the majority of abnormal midwifery cases in North Gloucestershire. The appointment is for a period of 6 months and the salary will be £425, £475, or £525 p.a., less £125 in respect of residential emoluments. The appointment will be vacant about the middle of July, 1955.

Applications, stating age, qualifications and experience, and accompanied by copies of 3 recent testimonials, should be sent to the Secretary, Cheltenham Group Hospital Management Committee, General Hospital, Cheltenham.

CHEPSTOW, MONMOUTHSHIRE. PLASTIC SURGERY JAW INJURIES AND BURNS CENTRE, ST. LAWRENCE HOSPITAL. (100 plastic surgery, 50 orthopædic beds.) SENIOR HOUSE OFFICER in Plastic Surgery required. Previous experience in specialty not essential. The successful candidate will receive a thorough training in plastic surgery and burns. Hospital intakes from most of Wales and provides extensive experience. There is another Senior House Officer in plastic surgery and also a Senior House Officer in orthopædics. Salary £745, less £150 board-residence.

Write, quoting 2 referees, to T. A. JONES, Group Secretary. 64, Cardiff-road, Newport, Mon.

COLCHESTER. BRITISH LEGION SANATORIUM, NAYLAND, COLCHESTER, ESSEX. (150 Beds for treatment of early pulmonary tuberculosis in women.) IPSWICH GROUP HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the appointment of SENIOR HOUSE OFFICER. Married quarters can be made available.

Applications, with 2 testimonials, to the Physician-Superintendent.

COLCHESTER. ESSEX COUNTY HOSPITAL. (189 Beds.) Applications invited for post of SENIOR HOUSE OFFICER (anæsthetics). Post tenable for 1 year. Recognised for D.A. The successful candidate will be called upon to give anæsthetics in other hospitals in the Group.

Applications, with copies of 3 testimonials, to Group Secretary, Colchester Hospital Management Committee, 14, Pope's-lane, Colchester, Essex.

COLCHESTER HOSPITAL MANAGEMENT COM-MITTEE. Applications are invited for :—

Black Notley Hospital, Braintree, Essex (544 Beds)

HOUSE OFFICER (orthopædic surgery). First, second, third, or pre-registration post; tenable for 6 months. Recognised for F.R.C.S.

Black Notley Hospital, Braintree, and Essex County Hospital, Colchester

HOUSE SURGEON (first, second, third, or pre-registration post), tenable for 6 months. Duties to include work in general surgical and gynæcological wards. Recognised for F.R.C.S.

Applications, with copies of 3 testimonials, to Group Secretary, Colchester Hospital Management Committee, 14, Pope's-lane, Colchester, Essex.

CROYDON. GENERAL HOSPITAL. (200 Beds.) Croydon GROUP HOSPITAL MANAGEMENT COMMITTEE. SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. SURGICAL REGISTRAR (post resident or non-resident) required at above Hospital as from mid-September. Candidates should be experienced in surgery and possession of higher surgical qualification an advantage.

Application forms obtainable from GEORGE A. PAINES, Group Secretary, Hospital Management Committee, General Hospital, London-road, Croydon, to be returned by 5th August.

CROYDON GROUP HOSPITAL MANAGEMENT COM-MITTEE. SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. ORTHOPÆDIC REGISTRAR (whole-time), resident or non-resident, for duties involving both orthopædic and fracture work mainly at Croydon General Hospital (200 Beds). Previous orthopædic experience essential and possession of higher surgical qualification desirable. Post vacant immediately.

Application forms obtainable from GEORGE A. PAINES, Secretary, Hospital Management Committee, General Hospital, Croydon, to be returned not later than 5th August.

CROYDON GROUP HOSPITAL MANAGEMENT COM-MITTEE. Locum Tenens ORTHOPÆDIC REGISTRARS (whole-time) required for General Hospital (200 Beds) 27th July–25th August inclusive and Mayday Hospital (618 Beds) 25th July for a period of approximately 2 months. Duties involve both orthopædic and fracture work.

Apply, giving full particulars and qualifications and experience, to— GEORGE A. PAINES, Group Secretary, Hospital Management Committee.

General Hospital, London-road, Croydon.

CROYDON. MAYDAY HOSPITAL. (618 Beds.) Croydon GROUP HOSPITAL MANAGEMENT COMMITTEE. Locum Tenens MEDICAL REGISTRAR (whole-time) required for the periods 22nd August–18th September and 23rd October–5th November. Post is non-resident but person appointed will be required to sleep at Hospital when "on call" for which accommodation is provided without charge.

Apply, giving full particulars of qualifications and experience, to— GEORGE A. PAINES, Group Secretary, Hospital Management Committee.

General Hospital, London-road, Croydon.

CROYDON. MAYDAY HOSPITAL. (618 Beds.) House SURGEON (resident) for Fracture and Orthopædic Unit required immediately for 6 months. Post approved for pre-registration candidates.

Application forms obtainable from GEORGE A. PAINES, Group Secretary, Hospital Management Committee, General Hospital, London-road, Croydon, to be returned immediately.

DARLINGTON DISTRICT HOSPITAL MANAGEMENT COMMITTEE. JUNIOR HOSPITAL MEDICAL OFFICER. This is a joint post between Hundens Unit (a hospital of Special Departments) serving E.N.T., ophthalmic, infectious diseases and chest, and East Haven (geriatrics). Good experience with responsibility for suitable candidate. Post may be resident at Hundens Unit (single accommodation) or a small semi-detached house in the grounds may be made available to a suitable candidate. Term of service is for a maximum of 4 years with option of reappointment. Salary £775–£50–£1075 p.a.

Applications should be sent forthwith, giving full particulars, and 3 names for reference, to the Group Secretary, Darlington Memorial Hospital.

DERBY. DERBYSHIRE ROYAL INFIRMARY. (398 Beds.) SHEFFIELD REGIONAL HOSPITAL BOARD. Whole-time NON-RESIDENT REGISTRAR (dermatology) required. Appointment for 1 year in first instance.

Apply to Secretary, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, by 1st August, 1955, giving age, nationality, qualifications, present and previous appointments with dates, naming 3 referees.

DERBY. DERBYSHIRE ROYAL INFIRMARY. Senior HOUSE OFFICER (casualty), vacant immediately. Recognised for F.R.C.S.

Apply, with copies of 2 testimonials, to Secretary.

DERBY. THE PASTURES HOSPITAL, Mickleover, DERBY. (Hospital for mental and nervous disorders.) DERBY NO. 3 HOSPITAL MANAGEMENT COMMITTEE. JUNIOR HOSPITAL MEDICAL OFFICER (Male or Female) required. Salary £775 rising by £50 p.a. to £1075. Facilities for obtaining D.P.M. and Membership training are available near to General Hospitals. Large outpatient system. House available to married person, alternatively residential accommodation at a charge of £170 p.a. The Hospital is pleasantly situated about 4 miles from the centre of Derby.

Applications, stating qualifications and experience, and giving the names of 2 referees, should be sent immediately to the Group Secretary.

DONCASTER ROYAL INFIRMARY. (330 Beds.) Don-CASTER HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of HOUSE SURGEON. Approved as pre-registration post and recognised for F.R.C.S. Vacant mid-August.

Applications to the Secretary to the Committee at the Doncaster Royal Infirmary.

DOUGLAS. NOBLE'S ISLE OF MAN HOSPITAL. (160 Beds.) HOUSE SURGEON required. House Officer grade post, becomes vacant 1st September, 1955. Hospital, approved for Pre-registration Service, has busy general surgical practice. 4 residents on staff. Salary scale £425–£475–£525 according to experience.

Applications, giving full particulars, with copies of 2 recent testimonials, to the Secretary, Noble's Isle of Man Hospital, Douglas.

EDGWARE GENERAL HOSPITAL, Edgware, Middlesex. Locum CASUALTY REGISTRAR (non-resident) required for 2 weeks commencing 27th August, 1955, at above Hospital.

Apply immediately to Medical Director.

EDGWARE GENERAL HOSPITAL, Edgware, Middlesex. Locum RESIDENT CASUALTY OFFICER (Senior House Officer) required at above Hospital for 2 weeks commencing 25th August, 1955.

Apply immediately to Medical Director.

ENFIELD, MIDDLESEX. CHASE FARM HOSPITAL. ENFIELD GROUP HOSPITAL MANAGEMENT COMMITTEE. SENIOR HOUSE OFFICER for casualty duties required 27th September, 1955. Non-resident post. Recognised by Royal College of Surgeons for the Final Fellowship examination. 12 months appointment. Hours: 9 A.M.–5.30 P.M. Monday–Friday; 9 A.M.–1 P.M. Saturday.

Applications, with the names and addresses of 2 referees, to the Secretary of the Management Committee.

ENFIELD, MIDDLESEX. CHASE FARM HOSPITAL. ENFIELD GROUP HOSPITAL MANAGEMENT COMMITTEE. Locum REGISTRAR in Orthopædics required 15th–28th August, 1955. Non-resident.

Apply Group Secretary with names of 2 referees.

ENFIELD, MIDDLESEX. CHASE FARM HOSPITAL. ENFIELD GROUP HOSPITAL MANAGEMENT COMMITTEE. RESIDENT SENIOR HOUSE OFFICER required in the Department of Anæsthesia. Vacant 12th October, 1955. 12 months appointment. The post is recognised for the D.A. and F.F.A.R.C.S. and affords a wide range of practical experience and tuition under Consultant supervision.

Applications, giving names and addresses of 2 referees, to the Secretary of the Management Committee.

EPPING. ST. MARGARET'S HOSPITAL (480 Beds) and HONEY LANE HOSPITAL, WALTHAM ABBEY (116 Beds).

HOUSE PHYSICIANS. 2 vacancies occurring 20th September, 1955, for fully registered practitioners (3 months at each hospital).

RESIDENT SENIOR HOUSE OFFICER (obstetrics). Vacancy occurring 9th September at St. Margaret's Hospital.

Salaries on national scale, less deduction for board, lodging, &c.

Applications, with 2 recent testimonials, to the Group Secretary, Epping Group Hospital Management Committee, St. Margaret's Hospital, Epping, Essex, by 29th July, 1955.

EXETER. ROYAL DEVON AND EXETER HOSPITAL. EXETER AND MID-DEVON HOSPITALS MANAGEMENT COMMITTEE. Applications are invited from pre-registration and registered medical practitioners for the post of HOUSE SURGEON, vacant 23rd September, 1955.

Applications, with copies of 2 recent testimonials, to the Hospital Secretary, by 30th July, 1955.

GLASGOW, N.1. STOBHILL GENERAL HOSPITAL. In the term beginning 1st August, vacancies for HOUSE OFFICERS (pre-registration) exist in the following units: Medicine (Acute Geriatrics), Dermatology.

Applications, giving the names of 2 referees, should be addressed to the Medical Superintendent.

GRAVESEND AND NORTH KENT HOSPITAL, Gravesend. MEDWAY AND GRAVESEND HOSPITAL MANAGEMENT COMMITTEE. Locum REGISTRAR in Orthopædics required for 2 weeks commencing 28th August at the above Hospital. Salary £24 per week.

Apply, with full details, to Group Secretary, 20, Star-hill, Rochester.

GRIMSBY GENERAL HOSPITAL. (238 Beds.) Grimsby HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of HOUSE PHYSICIAN (pre-registration or Senior House Officer grade). The Hospital has a well-equipped medical library and reading-room.

Applications, together with the names of 2 referees, to be sent to the Hospital Secretary, Grimsby General Hospital, Grimsby.

GRIMSBY GENERAL HOSPITAL. Grimsby Hospital MANAGEMENT COMMITTEE. Applications are invited for the post, now vacant, of SENIOR HOUSE OFFICER (orthopædic). Locum would be considered.

Applications, with names and addresses of 2 referees, to Hospital Secretary, Grimsby General Hospital.

HAROLD WOOD HOSPITAL, Harold Wood, Essex (near London). (415 Beds.) SENIOR HOUSE OFFICER (anæsthetics), resident. Main general and casualty hospital in Group. Recognised for D.A. and F.F.A.R.C.S.

Apply, giving full details, to the Hospital Secretary (Tel. Ingrebourne 2881).

HAROLD WOOD HOSPITAL, Harold Wood, Essex. (415 Beds.) SENIOR HOUSE OFFICER (Casualty Department), required in mid-August. Recognised for F.R.C.S. examination. Near London with good travelling to all parts. Salary £745 p.a., less £130 p.a. for board-residence.

Apply to Hospital Secretary (Tel. Ingrebourne 2881).

HEMEL HEMPSTEAD, HERTFORDSHIRE. WEST HERTS HOSPITAL. HOUSE SURGEON (pre-registration). Post vacant now.

Applications, mentioning 2 names for reference, should be sent to the Hospital Secretary.

HEREFORD. GENERAL HOSPITAL. (154 Beds.) House OFFICER (pædiatrics) required.

Applications, with copies of 2 recent testimonials, to Group Secretary, Hospital Management Committee, Victoria House, Eign-street, Hereford.

HIGH WYCOMBE AND DISTRICT WAR MEMORIAL HOSPITAL. (165 Beds. 6 residents.) SENIOR HOUSE OFFICER (surgical) required. £745 p.a., less emoluments. Appointment for 12 months. Post recognised for F.R.C.S. examination.

Applications, with names of 2 referees, to Group Secretary, St. Mary's Cottage, High Wycombe.

HILLINGDON HOSPITAL, Uxbridge, Middlesex. (General—705 Beds.) PÆDIATRIC HOUSE PHYSICIAN (resident) required. Duties include experience in general children's medical ward, Neonatal Unit and Pædiatric Outpatient Clinics. Post vacant early September. Appointment recognised for D.C.H.

Registered and pre-registration practitioners may apply stating age, qualifications, nationality and experience, with copies of not more than 3 recent testimonials, to Medical Director by 2nd August.

HITCHIN, HERTFORDSHIRE. LISTER HOSPITAL. Applications are invited for the post of RESIDENT HOUSE PHYSICIAN, vacant 18th August, 1955. (Recognised as pre-registration post.)

Applications, stating age, nationality, qualifications and experience, together with copies of 3 recent testimonials, to be sent to the Medical Administrator as soon as possible.

HORNCHURCH. ST. GEORGE'S HOSPITAL. (Neurosis UNIT.) Locum REGISTRAR in Psychiatry required for 6 weeks between July and September.

Applications, with dates available and names of 2 referees, to Group Secretary, Oldchurch Hospital, Romford, from whom further information can be obtained.

HOUNSLOW GENERAL HOSPITAL. (81 Beds.) Applications are invited for the appointment of RESIDENT CASUALTY OFFICER (Senior House Officer grade), recognised for F.R.C.S. examination. Post vacant 30th August, 1955.

Applications, stating age, qualifications, experience, with copies of 3 recent testimonials or names for reference, to the Hospital Secretary, Hounslow Hospital, Staines-road, Hounslow, Middlesex.

HOVE GENERAL HOSPITAL, Sussex. (75 Beds. 3 Resident Medical Officers.) HOUSE SURGEON AND CASUALTY OFFICER (recognised for F.R.C.S.—not pre-registration) required as soon as possible. Salary £525, less £125 p.a. for residential emoluments.

Applications, stating age, qualifications, experience, and naming 2 referees, to the Administrative Officer within 7 days of the appearance of this advertisement.

HULL A GROUP HOSPITAL MANAGEMENT COMMITTEE. SENIOR HOUSE OFFICER required from 1st September, 1955, for duties in the E.N.T. Departments of the Victoria Hospital for Sick Children, and the Hull Royal Infirmary.

Applications, with testimonials, to be sent to the Secretary, Victoria Hospital for Sick Children, Park-street, Hull.

KIDDERMINSTER AND DISTRICT GENERAL HOSPITAL. (112 Beds.) HOUSE SURGEON (not pre-registration) required at the above Hospital. Post vacant.

Applications, with the names of 3 referees, to the Hospital Secretary.

KINGSTON HOSPITAL, Wolverton-avenue, Kingston-UPON-THAMES. KINGSTON GROUP HOSPITAL MANAGEMENT COMMITTEE. Applications are invited from suitably qualified and experienced medical officers for the post of SENIOR HOUSE OFFICER (orthopædic and casualty). The post, which is recognised in casualty for the F.R.C.S., is vacant on 15th August, 1955.

Applications, with 2 recent testimonials, should reach the Physician-Superintendent of the Hospital by 29th July.

ILFORD AND BARKING GROUP HOSPITAL MANAGEMENT COMMITTEE. There is a vacancy for a SENIOR HOUSE OFFICER at the Ilford Isolation Hospital, Grove-road, Chadwell Heath (near London), on 1st August, 1955. Salary will be at the rate of £745 p.a., less emoluments. Small furnished bungalow available. This post is suitable for persons studying for the M.R.C.P., and D.C.H.

Applications, giving particulars of experience and qualifications and accompanied by copies of testimonials, should be sent to the undersigned within 7 days of the appearance of this advertisement.

H. F. HARRIS, Secretary.
King George Hospital, Ilford.

ILFORD. KING GEORGE HOSPITAL. There will be a vacancy for a CASUALTY OFFICER at the above Hospital on 1st September, 1955, at a salary of £745 p.a., less £145 p.a. emoluments. Senior House Officer grade. This post is recognised for the F.R.C.S.

Applications, giving full particulars and accompanied by testimonials, should be sent to the undersigned within 7 days of the appearance of this advertisement.

H. F. HARRIS, Secretary,
Ilford and Barking Group Hospital Management Committee.
King George Hospital, Ilford.

IPSWICH AND EAST SUFFOLK HOSPITAL (Anglesea ROAD WING). (356 Beds.) Applications are invited for the post of SENIOR HOUSE OFFICER (Resident Anæsthetist). The post, which becomes vacant on 5th September, 1955, and is normally of 1 years duration, is recognised for the D.A. and the F.F.A.R.C.S. examinations.

Applications, stating age and nationality, together with recent testimonials, to Hospital Secretary.

ISLEWORTH. WEST MIDDLESEX HOSPITAL. South WEST MIDDLESEX HOSPITAL MANAGEMENT COMMITTEE. REGISTRAR (whole-time) in Obstetrics and Gynæcology. 1 year in first instance. Hospital may be visited by direct appointment.

Application forms obtainable from, and returnable to, Group Secretary, South West Middlesex Hospital Management Committee, West Middlesex Hospital, Isleworth, by 2nd August, 1955.

ISLEWORTH. WEST MIDDLESEX HOSPITAL. South WEST MIDDLESEX HOSPITAL MANAGEMENT COMMITTEE. SENIOR HOUSE OFFICER required for Admissions and Casualty Department. Must have held medical and surgical posts.

Applications, stating age, nationality, qualifications and experience, with copies of up to 3 recent testimonials, to Group Secretary, West Middlesex Hospital, Isleworth, by 3rd August, 1955.

LEAMINGTON SPA. WARNEFORD HOSPITAL. (197 Beds.) SENIOR HOUSE OFFICER (anæsthetics) for duties at the above Hospital. Post vacant and recognised for D.A.

Applications to Hospital Secretary.

LIVERPOOL, 6. NEWSHAM GENERAL HOSPITAL. (1304 Beds.) Applications are invited from medical practitioners, Male or Female, for the appointment of HOUSE SURGEON (pre-registration), resident or non-resident. Salary £425–£475–£525 p.a., less £125 p.a. in respect of residential emoluments, if resident.

Apply to the Physician-Superintendent at the Hospital as soon as possible.

LIVERPOOL. WALTON HOSPITAL. (1321 Beds.) SENIOR HOUSE OFFICER (resident or non-resident), Chest Diseases. The appointment offers experience in tuberculous and non-tuberculous chest diseases, under the supervision of the Consultant Chest Physicians and Thoracic Surgeon to the North Liverpool Hospital Group. Vacant 1st September, 1955.

Applications, stating age, qualifications and experience, together with copies of 2 recent testimonials, to the Physician-Superintendent, Walton Hospital, Liverpool, 9.

LEEDS. MEANWOOD PARK HOSPITAL, Tongue-lane, LEEDS, 6. (831 Beds—Mental Deficiency.) LEEDS (GROUP B) HOSPITAL MANAGEMENT COMMITTEE. JUNIOR HOSPITAL MEDICAL OFFICER (resident), required. Single accommodation available.

Application forms and further particulars from Medical Superintendent.

LEEDS, 9. ST. JAMES'S HOSPITAL. Leeds A Group HOSPITAL MANAGEMENT COMMITTEE. Applications are invited from registered medical practitioners (Male and Female) for the appointment of SENIOR HOUSE OFFICER (orthopædics). The appointment, which is recognised by the Royal College of Surgeons for Fellowship, will be for a period of 1 year and the salary will be in accordance with the agreed terms and conditions of service of hospital medical and dental staffs, namely, £745 p.a. with an appropriate deduction in respect of board, lodgings, and other services provided.

Applications, stating age, qualifications, experience, &c., together with the names of 2 referees, to be forwarded to the undersigned as soon as possible.

J. FOLKARD, Secretary to the Committee.
Administrative Offices, St. James's Hospital, Leeds, 9.

LEEDS. THE UNITED LEEDS HOSPITALS. The GENERAL INFIRMARY AT LEEDS. REGISTRAR in Dermatology required for 1 year in the first instance from 1st October. Terms and conditions of service for hospital medical staff apply.

Applications, stating age, qualifications and previous posts with dates, with the names of 3 referees, to be sent to the Sub-Dean, School of Medicine, Leeds, 2, by 30th July.

LEEDS, 7. JEWISH HERZL MOSER HOSPITAL. Leeds A GROUP HOSPITAL MANAGEMENT COMMITTEE. Locum RESIDENT MEDICAL OFFICER (Junior Hospital Medical Officer) required at the above Hospital for a period of 4 weeks commencing 1st August, 1955. Salary £17 10s. per week with a deduction for services provided.

Apply to the Group Secretary, St. James's Hospital, Leeds, 6.

LEEDS, 2. PUBLIC DISPENSARY AND HOSPITAL. LEEDS A GROUP HOSPITAL MANAGEMENT COMMITTEE. Applications are invited from registered medical practitioners for the appointment of CASUALTY OFFICER (Senior House Officer) at the above Hospital. The appointment, which is recognised by the Royal College of Surgeons for Fellowship, will be for a period of 1 year. Salary in accordance with the agreed terms and conditions of service of hospital medical and dental staffs, with an appropriate deduction in respect of board, lodging, &c.

Applications, stating age, qualifications, experience, &c., together with the names of 2 referees, to be forwarded to the undersigned as soon as possible.

J. FOLKARD, Secretary to the Committee.

Administrative Offices, St. James's Hospital, Leeds, 9.

LEEDS REGIONAL HOSPITAL BOARD. Registrar vacancies.

Anæsthetics

(*a*) St. James's Hospital, Leeds, with additional duties at hospitals in the Leeds A and B Groups (non-resident). Recognised for the F.F.A.R.C.S.

(*b*) Bradford A and B Groups (preferably resident). Recognised for the F.F.A.R.C.S. approximately 700 Beds in the surgical specialties. Establishment 1 Senior Registrar and 2 Registrars.

General Medicine

Regional Rheumatism Centre, Harrogate (240 Beds) (9 sessions), and the Rheumatism Clinic, General Infirmary at Leeds (2 sessions). Resident at Royal Bath Hospital, Harrogate.

General Surgery

Clayton Hospital, Wakefield (75 general surgical beds). Duties are those of Resident Surgical Officer. (Recognised for the F.R.C.S.)

Psychiatry

Broadgate Hospital, Beverley (600 Beds). Accommodation for single person (resident/non-resident). If desired facilities for attendance at the Leeds University will be provided if the successful candidate is studying for the D.P.M.

Applications, stating age, qualifications and details of appointments held showing dates, with names and addresses of 3 referees, to the Secretary, Joint Registrars Committee, Park-parade, Harrogate, by 27th July, 1955.

LEWES (near). CHAILEY HERITAGE (Craft School and Hospital), NORTH CHAILEY, near LEWES, SUSSEX. (305 Beds.) MID-SUSSEX HOSPITAL MANAGEMENT COMMITTEE. SENIOR HOUSE OFFICER required for Children's Orthopædic Unit with orthopædic clinics. Good experience for long-term orthopædic and pædiatric work. 1 years previous house appointment essential. Post vacant end of July. Salary under National Health Service regulations.

Applications, with 2 referees names, should be forwarded to the Medical Administrator.

LOUTH. COUNTY INFIRMARY. (215 Beds.) Grimsby HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post, now vacant, of SENIOR HOUSE OFFICER (orthopædic and casualty).

Applications, stating age and experience, together with names of 2 referees, to the Hospital Secretary.

MAIDENHEAD HOSPITAL, St. Luke's-road, Maidenhead. RESIDENT SURGICAL REGISTRAR required at above Hospital. Hospital may be visited by direct appointment.

Application forms obtainable from, and returnable to, Secretary, Windsor Group Hospital Management Committee, Almaroad, Windsor, by 5th August.

MAIDSTONE. WEST KENT GENERAL HOSPITAL. (141 Beds.) MID-KENT HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the pre-registration post of HOUSE SURGEON. 6 months appointment. Salary at the rate of £425–£475–£525 according to experience. A deduction at the rate of £125 a year is made in respect of board and lodging and other services provided.

Applications should be forwarded as soon as possible to the Administrative Officer at the Hospital.

MAIDSTONE. WEST KENT GENERAL HOSPITAL. (141 Beds.) MID-KENT HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the appointment of RECEIVING ROOM OFFICER. Salary £745 a year, with a deduction of £150 a year for residential emoluments.

Applications to the Administrative Officer at the Hospital as soon as possible.

MANCHESTER, 20. WITHINGTON HOSPITAL. South MANCHESTER HOSPITAL MANAGEMENT COMMITTEE. SENIOR HOUSE OFFICER (anæsthetics) required for the South Manchester Group. The post is recognised by the Royal College of Surgeons for the F.F.A.R.C.S. and for the D.A.

Applications, with full details, to the Group Secretary immediately.

MANCHESTER REGIONAL HOSPITAL BOARD. Bury AND ROSSENDALE HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of REGISTRAR in Obstetrics and Gynæcology at Fairfield General Hospital. The post is resident and a house is available in the Hospital grounds.

Apply, stating age, qualifications, experience and names of 2 referees, to H. WILKINSON, Group Secretary.

Bury General Hospital, Bury, Lancs.

MANCHESTER REGIONAL HOSPITAL BOARD. SURGICAL REGISTRAR (Resident Surgical Officer), post vacant Rochdale Infirmary 1st October 1955.

Apply at once to Group Secretary, Central Offices, Birch Hill Hospital, Rochdale.

MANCHESTER REGIONAL HOSPITAL BOARD. Applications are invited for the whole-time resident post of REGISTRAR in General Medicine in the Ashton, Hyde and Glossop Group of hospitals.

Applications, stating age, nationality, qualifications and experience, together with copies of 3 testimonials, should be forwarded to the Group Secretary, Ashton-under-Lyne General Hospital, Ashton-under-Lyne.

MANCHESTER REGIONAL HOSPITAL BOARD invites applications for the post of RESIDENT REGISTRAR in Obstetrics and Gynæcology. The duties will be with the Stockport and Buxton Hospital Management Committee, mainly at Stepping Hill Hospital and Stockport Infirmary, where there are 68 obstetric and 48 gynæcological beds. The post is recognised for M.R.C.O.G. and is vacant 1st October, 1955.

Applications, stating age, experience and qualifications, together with the names of 2 referees, to be forwarded to—

H. G. PRICE, Group Secretary.

59B, Shaw-heath, Stockport, Cheshire.

MANCHESTER REGIONAL HOSPITAL BOARD. South MANCHESTER HOSPITAL MANAGEMENT COMMITTEE. Applications are invited from registered medical practitioners for the post of RESIDENT SURGICAL OFFICER (Registrar grade) at the Wythenshawe Hospital. Post will include responsibility for general surgical and gynæcological beds.

Applications, stating age, qualifications, present post, experience, and names of 2 referees, to be forwarded to the Group Secretary, Withington Hospital, Manchester, 20, within 7 days of the appearance of this advertisement.

MANCHESTER REGIONAL HOSPITAL BOARD.

(*a*) SENIOR REGISTRAR in Psychiatry. Appointee will commence duties at Prestwich Hospital, Manchester, but will later be required to serve for a period in 1 of the psychiatric teams based on general hospitals elsewhere in the Region. D.P.M. essential. 4th August, 1955.

(*b*) 2 posts of SENIOR REGISTRAR in Radiology, 1 in the North Manchester Group of hospitals (Crumpsall, Ancoats, Northern and Manchester Victoria Memorial Jewish Hospitals) and at Booth Hall (Children's) Hospital, and 1 in the South Manchester Group of hospitals at Withington Hospital. Arrangements may later be made for the persons appointed to transfer to the United Manchester Hospitals for further experience and training. 8th August, 1955.

(*c*) SENIOR REGISTRAR in General Medicine in the South Manchester Group of hospitals, mainly at Withington Hospital, Manchester. M.R.C.P. desirable. Arrangements may later be made for the person appointed to transfer to the United Manchester Hospitals (Manchester Royal Infirmary) for further experience and training. 8th August, 1955.

Application forms from the Senior Administrative Medical Officer to the Board, Cheetwood-road, Manchester, 8, to be returned by dates stated.

(*d*) Locum SENIOR REGISTRARS. Salary £24 a week.

(i) Pædiatrics, Royal Manchester Children's Hospital, Pendlebury and St. Mary's Hospitals, Manchester—joint appointment with United Manchester Hospitals. Period, 1 year from 1st September, 1955. Previous experience in pædiatrics and higher qualifications essential. 27th July, 1955.

(ii) General Medicine—Salford Royal Hospital. Period 1st September, 1955–31st May, 1956. 8th August, 1955.

Applications, giving full particulars and names of 2 referees, to be forwarded to the Senior Administrative Medical Officer at above address by dates stated.

MANCHESTER REGIONAL HOSPITAL BOARD invite applications for the post of REGISTRAR in Chest Diseases to the Wigan and Leigh and Wrightington Groups of hospitals. 2 busy chest clinics and opportunity to gain experience in Thoracic Surgical Unit.

Applications, together with the names of 2 referees, to the Secretary, Wigan and Leigh Hospital Management Committee, Knowsley House, Wigan, to be received not later than 4th August, 1955.

MANCHESTER REGIONAL HOSPITAL BOARD. Applications are invited for the whole-time post of REGISTRAR in Chest Diseases in the Ashton, Hyde and Glossop Group and Oldham and District Group of hospitals. The post offers wide experience in both outpatient clinics and pulmonary hospitals. Residential accommodation may be arranged.

Applications to the Group Secretary, Ashton, Hyde and Glossop Hospital Management Committee, Ashton-under-Lyne, General Hospital, Ashton-under-Lyne, Lancashire.

MANCHESTER REGIONAL HOSPITAL BOARD. REGISTRAR for the Geriatric Department of the Bolton and District Group of hospitals (which contains acute admission wards and has full physiotherapy, laboratory and radiological facilities) and also to assist in the supervision of the health of nurses.

Applications, stating age, nationality, qualifications, experience and the names of 2 referees, should be sent immediately to Group Secretary, Bolton and District Hospital Management Committee, The Royal Infirmary, Bolton.

MANCHESTER REGIONAL HOSPITAL BOARD. REGISTRAR in General Medicine to the Bolton and District Group of hospitals, with main duties at Bolton District General Hospital and Bolton Royal Infirmary. Vacant 1st September.

Applications, stating age, nationality, qualifications, experience, and the names of 2 referees, should be sent immediately to Group Secretary, Bolton and District Hospital Management Committee, The Royal Infirmary, Bolton.

NEWCASTLE GENERAL HOSPITAL. (838 Beds.) NEWCASTLE UPON TYNE HOSPITAL MANAGEMENT COMMITTEE. A vacancy will occur on 1st August, 1955, in the Orthopædic Department of the above Hospital for a HOUSE OFFICER or SENIOR HOUSE OFFICER according to experience. The post is resident.

Applications should be addressed to the Secretary, Newcastle General Hospital, Westgate-road, Newcastle upon Tyne, 4, together with 1 copy of 2 recent testimonials.

NEWCASTLE GENERAL HOSPITAL. (838 Beds.) NEWCASTLE UPON TYNE HOSPITAL MANAGEMENT COMMITTEE. The resident post of SENIOR HOUSE OFFICER (general surgery), tenable for 12 months, is now vacant.

Applications, with 1 copy of 2 testimonials, should be sent to the Secretary, Newcastle General Hospital, Westgate-road, Newcastle upon Tyne, 4, as soon as possible.

NEWCASTLE REGIONAL HOSPITAL BOARD.

Sunderland Area Hospital Management Committee

REGISTRAR PHYSICIAN (whole-time), Geriatric Unit, Sunderland General Hospital, &c. Single accommodation available, married accommodation may be available.

REGISTRAR ORTHOPÆDIC SURGEON (whole-time), at Sunderland Orthopædic and Accident Hospital (120 Beds) and Grindon Sanatorium (50 Beds). Post suitable for applicant interested in working for Primary F.R.C.S. and arrangements can be made for person appointed to attend postgraduate lectures and demonstrations in anatomy and physiology at Medical School in Newcastle. Post recognised for F.R.C.S. examination.

Applications, with names and addresses of 3 referees, to Senior Administrative Medical Officer, "Blythswood South," Osborne-road, Newcastle-upon-Tyne, 2, within 14 days.

NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. Whole-time REGISTRAR in Dermatology, based on West Middlesex Hospital, Isleworth (1142 Beds). Duties will include also clinics at hospitals in the Uxbridge, Staines, and Windsor Groups. Appointment for 1 year in first instance. Hospital may be visited by direct appointment.

Application forms obtainable from, and returnable to, Group Secretary, South West Middlesex Group Hospital Management Committee, West Middlesex Hospital, Isleworth, by 9th August, 1955.

NORWICH. HELLESDON HOSPITAL. East Anglian REGIONAL HOSPITAL BOARD. REGISTRAR in Psychiatry. Associated with this modern mental hospital (960 Beds) are a separate early treatment hospital with an electro-encephalographic department, outpatient clinics for both adults and children, and a special unit for the elderly mentally infirm. Post recognised for D.P.M. House available. Appointment for 1 year, renewable for second year.

Applications, stating age, experience, and names of 3 referees, to Secretary of Board, 117, Chesterton-road, Cambridge, by 8th August, 1955. Candidates invited to visit Hospital by direct arrangement with Medical Superintendent.

NOTTINGHAM AND MIDLAND EYE INFIRMARY. Required, 2 SENIOR HOUSE OFFICERS, duties to commence immediately and 31st July. Salary and conditions of service in accordance with Ministry regulations.

Applications, stating age, qualifications and experience, together with copies of testimonials, to be sent to the Group Secretary, General Hospital, Nottingham.

NOTTINGHAM. FIRS MATERNITY HOSPITAL. (40 Beds.) Required, RESIDENT SENIOR HOUSE OFFICER (obstetrics), post vacant 1st August, 1955. Recognised for D.Obst.R.C.O.G. Previous experience in obstetrics an advantage.

Applications, with copies of 3 testimonials, to the Hospital Secretary, City Hospital, Hucknall-road, Nottingham.

NOTTINGHAM GENERAL HOSPITAL. Applications are invited for the post of CLINICAL PATHOLOGIST (Senior House Officer grade), resident or non-resident; duties to commence as soon as possible. Previous experience in pathology not essential. Opportunities for training in all branches of clinical pathology are afforded in a department serving over 1200 beds. Salary and conditions of service in accordance with Ministry regulations.

Applications, stating names and addresses of 3 referees, to be received within 2 weeks of this advertisement addressed to the Secretary.

NOTTINGHAM GENERAL HOSPITAL. Hogarth Radiotherapy Centre. A vacancy exists at the above Centre for a SENIOR HOUSE OFFICER in Radiotherapy or REGISTRAR (if in possession of Part I, D.M.R.T.) in Radiotherapy. The Centre is recognised as a Training School for both Part I and II D.M.R.T. (Royal Colleges of London) in conjunction with the University of Nottingham, and instruction for this examination can be given to those interested and suitable. The position offers excellent experience for persons studying for other postgraduate degrees.

Apply as soon as possible, stating age, qualifications and experience, together with names of 3 referees, to the Group Secretary, General Hospital, Nottingham.

NOTTINGHAM GENERAL HOSPITAL. Required, SENIOR MEDICAL HOUSE OFFICER for the above Hospital, duties to commence at the beginning of August, 1955. Salary and conditions of service in accordance with those laid down by the Ministry.

Applications, stating age, qualifications and experience, together with copies of testimonials, to be sent to—

General Hospital, Nottingham. HENRY M. STANLEY.

NOTTINGHAM GENERAL HOSPITAL. Applications are invited from registered medical practitioners for the post of SENIOR ORTHOPÆDIC AND FRACTURE HOUSE OFFICER duties to commence early August. The post offers exceptional experience in traumatic surgery. Salary and conditions of service in accordance with Ministry Regulations.

Applications, stating age, qualifications and experience, nationality, &c., together with copies of testimonials, to be sent to the Group Secretary.

OXFORD. UNITED OXFORD HOSPITALS. Applications invited for post of NON-RESIDENT REGISTRAR in Anæsthetics at the Radcliffe Infirmary, Oxford, commencing 1st October, 1955.

Application forms obtainable from Administrator, Radcliffe Infirmary, Oxford, should be returned not later than 6th August, 1955.

OXFORD. UNITED OXFORD HOSPITALS. Applications invited for post of NON-RESIDENT REGISTRAR to Tuberculous Meningitis Unit at Osler Hospital, Headington, Oxford, commencing 1st October, 1955. Post for 1 year in first instance but eligible for extension to a second year. The post is primarily concerned with the management of tuberculous meningitis, but also offers experience in neurological research and other types of tuberculosis.

Application forms obtainable from Administrator, Radcliffe Infirmary, Oxford, should be returned not later than 6th August, 1955.

OTLEY, YORKSHIRE. THE GENERAL HOSPITAL. (172 Beds.) ILKLEY AND OTLEY HOSPITAL MANAGEMENT COMMITTEE. RESIDENT MEDICAL OFFICER required (general medicine and pædiatrics). Junior Hospital Medical Officer or Senior House Officer. Full Consultant staff who are members of the Teaching staff of The University of Leeds. Single quarters in hospital or unfurnished self-contained flat nearby. Duties to commence on 1st September, 1955.

Applications, stating age, nationality and experience, with names of 2 referees, to the Group Secretary as soon as possible.

PERTH ROYAL INFIRMARY. The post of Senior HOUSE OFFICER (Anæsthetic Department), will fall vacant on 1st August, 1955. The post is recognised under regulations for the D.A. and F.F.A.R.C.S.

Applications, giving details of age, qualifications, experience, and names of 2 referees, should be sent to the Group Medical Superintendent, Perth Royal Infirmary, Perth.

PETERBOROUGH. MEMORIAL HOSPITAL. PETERBOROUGH AND STAMFORD HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the following appointments:—

HOUSE SURGEON, vacant now.

HOUSE PHYSICIAN, vacant on 22nd August, 1955.

Applications, with testimonials should be addressed to the Secretary, Memorial Hospital, Peterborough.

RE-ADVERTISEMENT

PETERBOROUGH. THE MEMORIAL HOSPITAL AND OBSTETRIC ANNEXES. PETERBOROUGH AND STAMFORD HOSPITAL MANAGEMENT COMMITTEE. HOUSE SURGEON (obstetrics and gynæcology). Applications are invited for vacancy on 28th July, 1955. Busy Gynæcological Department and 54 obstetric beds. Unit consists of a Consultant, Registrar and 2 House Surgeons. (Recognised for D.Obst.R.C.O.G.)

Application forms from Secretary.

PLYMOUTH, SOUTH DEVON AND EAST CORNWALL GENERAL HOSPITAL GROUP. AREA PATHOLOGICAL DEPARTMENT. Applications invited from duly qualified and registered medical practitioners for the appointment of RESIDENT SENIOR HOUSE OFFICER in Pathology, vacant 1st September, 1955. The appointment will be for a period of 12 months, in the Area Laboratory at the South Devon and East Cornwall Hospital, Greenbank-road, Plymouth, which provides excellent modern working facilities.

Applications, stating age, nationality, qualifications, and experience, together with the names and addresses of 3 referees, to be sent to ARTHUR R. CASH, Group Secretary.

7, Nelson-gardens, Stoke, Plymouth.

PLYMOUTH. SOUTH DEVON AND EAST CORNWALL HOSPITAL.

SENIOR HOUSE OFFICER in Surgery, Devonport Section, vacant 21st August, 1955. Recognised for the F.R.C.S.

SENIOR HOUSE OFFICER to Casualty and Traumatic Department, Freedom Fields Section, vacant 3rd August, 1955.

SENIOR HOUSE OFFICER in Anæsthetics, South Devon and East Cornwall Hospital, Plymouth, vacant 1st September, 1955, recognised for the D.A. and Fellowship. This appointment will be for a period of 12 months.

HOUSE OFFICER in Obstetrics, Alexandra Maternity Home Devonport, vacant immediately.

Applications, stating age, nationality, qualifications and experience, with names of 3 referees, to be sent to—

ARTHUR R. CASH, Group Secretary, Plymouth,
South Devon and East Cornwall General Hospital Group.
7, Nelson-gardens, Stoke, Plymouth.

PORTSMOUTH GROUP HOSPITAL MANAGEMENT COMMITTEE.

Royal Portsmouth Hospital (104 orthopædic, 70 surgical and 65 medical beds)

SENIOR HOUSE OFFICER (orthopædic), vacant 31st August.

HOUSE OFFICER (orthopædic), vacant 31st August. Pre-registration post.

HOUSE SURGEON, vacant 1st August. Pre-registration post.

HOUSE PHYSICIAN, vacant 17th August. Pre-registration post.

St. Mary's Hospital (74 medical and 107 surgical beds)

HOUSE PHYSICIAN, vacant 24th August. Pre-registration post.

HOUSE SURGEON, vacant 25th July. Pre-registration post.

HOUSE SURGEON, vacant 26th July. Pre-registration post.

HOUSE SURGEON, vacant 31st July. Pre-registration post.

Applications, stating age, experience and qualifications, together with names of 2 referees, should be forwarded as soon as possible to L. C. ROGERS.

35, Grove-road South, Southsea.

PORTSMOUTH GROUP HOSPITAL MANAGEMENT COMMITTEE.

Queen Alexandra Hospital

SENIOR HOUSE OFFICER required for the Gynæcological Department of the Group for duties at the above Hospital. 40 gynæcological beds. Recognised for M.R.C.O.G. Vacant now.

Applications, stating age, experience, and qualifications, together with names of 2 referees, should be forwarded as soon as possible to L. C. ROGERS.

35, Grove-road South, Southsea.

ROMFORD, ESSEX. OLDCHURCH HOSPITAL. (722 Beds.) ORTHOPÆDIC HOUSE SURGEON (resident) required in the Orthopædic and Accident Unit from 8th August, 1955. The service consists of 100 Beds equally divided between traumatic surgery and "cold" orthopædics. Post is recognised for pre-registration purposes and for F.R.C.S.

Applications to be sent to Group Secretary, Romford Hospital Management Committee, Oldchurch Hospital, as soon as possible.

ROMFORD, ESSEX. OLDCHURCH HOSPITAL. (722 Beds.) RESIDENT HOUSE SURGEONS (2) required from 15th and 23rd August, 1955, in the General Surgical Unit at the above Hospital. Recognised for F.R.C.S. Open to either pre-registration applicants or to fully qualified practitioners. This very active General Surgical Unit of approximately 100 Beds affords ample opportunities for candidates to obtain first-class tuition and experience.

Applications should be forwarded immediately to Group Secretary, Romford Group Hospital Management Committee, Oldchurch Hospital, Romford.

ROMFORD, ESSEX. RUSH GREEN HOSPITAL. (301 Beds.) RESIDENT HOUSE OFFICER (general surgery) required from 14th August, 1955. Post is recognised for pre-registration purposes and for F.R.C.S.

Applications should be forwarded immediately to Medical Superintendent stating also names of 2 referees.

READING. BATTLE HOSPITAL. (374 Beds.) Applications are invited from registered and provisionally registered medical practitioners for post of RESIDENT JUNIOR HOUSE SURGEON in the Area Accident and Orthopædic Department, vacant 1st August, 1955. F.R.C.S. recognised. Also casualty duties. Salary £425–£525 p.a., less £125 board-residence.

Apply, stating age, qualifications with dates, nationality, present position, with copy of 1 recent testimonial, to Hospital Secretary.

READING. ROYAL BERKSHIRE HOSPITAL. (405 Beds.) Applications are invited from registered and provisionally registered medical practitioners, Male or Female, for the resident post of JUNIOR HOUSE SURGEON (E.N.T.), vacant 21st August, 1955. Salary £475–£575 p.a., less £125 p.a., board-residence, &c.

Write, stating age, qualifications with dates, nationality, with copy of 1 recent testimonial, to Secretary, Royal Berkshire Hospital, Reading.

READING. ROYAL BERKSHIRE HOSPITAL. (401 Beds.) Applications are invited from registered medical practitioners only for the resident post of JUNIOR HOUSE SURGEON (gynæcology), vacant immediately and tenable for 6 months.

Write, stating age, qualifications with dates, nationality, present post, with copy of 1 recent testimonial, to the Secretary.

RUGBY. HOSPITAL OF ST. CROSS, AND ST. MARY'S HOSPITAL, HARBOROUGH MAGNA. HOUSE OFFICER (gynæcology and obstetrics). Obstetrics 40 Beds. Gynæcology 12 Beds. Not pre-registration. Resident.

Applications to Hospital Secretary, Hospital of St. Cross, Rugby.

SALISBURY GENERAL HOSPITAL. Salisbury Group HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the appointment of SENIOR HOUSE OFFICER to the E.N.T. Department. Post is recognised for D.L.O. and F.R.C.S. and is vacant September, 1955.

Applications, naming 2 referees, to Group Secretary, Odstock Hospital, Salisbury, Wilts.

SCUNTHORPE AND DISTRICT WAR MEMORIAL HOSPITAL. (267 Beds. Recognised for training for F.R.C.S.) SHEFFIELD REGIONAL HOSPITAL BOARD. Whole-time RESIDENT or NON-RESIDENT REGISTRAR (orthopædic) required. Appointment for 1 year in first instance.

Apply Secretary, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, by 1st August, 1955, giving age, nationality, qualifications, present and previous appointments with dates, naming 3 referees.

SCUNTHORPE. WAR MEMORIAL HOSPITAL. (267 Beds.) SCUNTHORPE HOSPITAL MANAGEMENT COMMITTEE. Immediate vacancy for HOUSE SURGEON (Senior House Officer), resident.

Applications, naming 2 referees, to Group Secretary.

SCOTLAND. NORTHERN REGIONAL HOSPITAL BOARD invite applications for a post of SENIOR HOUSE OFFICER under the Joint Training Scheme in Hospital and General Practice, in which the Board and the Executive Council for the County of Inverness are associated. The Scheme provides a combined training of 2 years duration for young medical practitioners intending to enter medical practice or a specialty. Concurrent experience in hospital and general practice is given in various departments of the hospitals at Inverness and with selected general practitioners in the town and surrounding district. The post is non-resident and the salary is £745 p.a.

Candidates should apply by 12th August, 1955, on forms obtainable from the undersigned, by whom further particulars will be supplied on request.

A. M. FRASER, M.D.,
Secretary and Administrative Medical Officer.
Office of the Northern Regional Hospital Board,
Raigmore, Inverness.

SCOTLAND. WESTERN REGIONAL HOSPITAL BOARD. Applications are invited for the appointment of Whole-time REGISTRAR in Surgery based at the Royal Alexandra Infirmary, Paisley, which will be for 1 year in the first instance. This appointment is subject to the National Health Service (Scotland) superannuation regulations.

Applications (12 copies), stating date of birth, qualifications, experience, present appointment, and the names of 3 referees, to reach the Secretary, Western Regional Hospital Board, 64, West Regent-street, Glasgow, by 12th August, 1955.

SCOTLAND. EASTERN REGIONAL HOSPITAL BOARD. Pædiatrics. DUNDEE GENERAL HOSPITALS. Applications are invited for the post of Locum REGISTRAR in Pædiatrics at Dundee Royal Infirmary (510 Beds) and Maryfield Hospital, Dundee (400 Beds), General Teaching Hospitals associated with the University of St. Andrews. The duties will include teaching of undergraduates. The appointment will be for at least 6 months. Salary and conditions of service in accordance with national agreement.

Forms of application and further particulars from the Secretary to the Board, "Bracknowe," 430, Blackness-road, Dundee, with whom applications must be lodged not later than 6th August, 1955.

SCOTLAND. NORTH-EASTERN REGIONAL HOS-PITAL BOARD. Applications are invited for the post of SENIOR REGISTRAR in General Medicine—main duties in Aberdeen General Hospitals. The appointment is for a period of 1 year in the first instance.

Applications, giving 2 names for reference, should be submitted by 10th August, 1955, to the Secretary, 1, Albyn-place, Aberdeen, from whom further particulars may be obtained.

SCOTLAND. SOUTH-EASTERN REGIONAL HOS-PITAL BOARD. Applications are invited for the appointment of REGISTRAR in Medical Pædiatrics at the Royal Hospital for Sick Children, Edinburgh, vacant on 1st October, 1955.

Applications, giving particulars of age, previous experience and qualifications, together with the names of 2 referees, should be submitted to the Secretary, South-Eastern Regional Hospital Board, Scotland, 11, Drumsheugh-gardens, Edinburgh, 3, by 13th August, 1955.

SCOTLAND. SOUTH-EASTERN REGIONAL HOS-PITAL BOARD. Applications are invited for the appointment of REGISTRAR in Radiodiagnosis at the Royal Infirmary of Edinburgh with duties at other hospitals in the Region.

Applications, giving particulars of age, qualifications and previous experience, together with the names of 2 referees, should be submitted to the Secretary, South-Eastern Regional Hospital Board, Scotland, 11, Drumsheugh-gardens, Edinburgh, 3, by 20th August, 1955.

SCOTLAND. SOUTH-EASTERN REGIONAL HOS-PITAL BOARD. Applications are invited for the appointment of REGISTRAR in Pathology at the Edinburgh Northern Group of hospitals, vacant on 1st October, 1955.

Applications, giving particulars of age, previous experience and qualifications, together with the names of 2 referees, should be submitted to the Secretary, South-Eastern Regional Hospital Board, Scotland, 11, Drumsheugh-gardens, Edinburgh, 3, by 13th August, 1955.

SHEFFIELD REGIONAL HOSPITAL BOARD. Sheffield NATIONAL CENTRE FOR RADIOTHERAPY. Whole-time NON-RESIDENT SENIOR REGISTRAR required. Candidates should possess the Diploma in Radiotherapy or a higher qualification in medicine or surgery. Duties mainly in Sheffield but there may be occasional duties at associated centres in the Region. Appointment for 1 year in first instance reviewable annually.

Apply to Secretary, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, by 8th August, 1955, giving age, nationality, qualifications, present and previous appointments with dates, naming 3 referees.

SHEFFIELD REGIONAL HOSPITAL BOARD. Whole-time SENIOR REGISTRAR in Psychiatry required for The Pastures Hospital, Mickleover, near Derby. D.P.M. essential. House available. Appointment for 1 year in the first instance, reviewable annually. Opportunity for research and experience in those special branches of psychiatry available in the Hospital area.

Application forms and details from Senior Administrative Medical Officer, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, 10. Forms to be returned by 1st August, 1955.

SHREWSBURY. ROYAL SALOP INFIRMARY AND COPTHORNE HOSPITAL. (500 Beds.) RESIDENT ANÆSTHETIST (Senior House Officer). Post recognised for F.F.A.R.C.S. Vacant 15th August, 1955.

Applications and copy testimonials to Group Secretary, Royal Salop Infirmary, Shrewsbury.

SLOUGH, BUCKINGHAMSHIRE. UPTON HOSPITAL. WINDSOR GROUP HOSPITAL MANAGEMENT COMMITTEE. Locum SENIOR SURGICAL REGISTRAR required 20th August–10th September. Person appointed may be required to do emergency work at other hospitals within the Group.

Applications, together with copies of 3 testimonials, to Hospital Secretary.

SOUTHAMPTON. ROYAL SOUTH HANTS HOSPITAL. (278 Beds.) ORTHOPÆDIC HOUSE SURGEON required. Post recognised for Pre-registration Service and tenable for 6 months. This Hospital is the centre to which all trauma from a large industrial town and port is directed, thus providing excellent experience in the treatment of traumatic conditions; patients with orthopædic conditions are also drawn from a wide area.

Applications, with copies of testimonials, should be sent as soon as possible, to the Group Secretary, Southampton Group Hospital Management Committee, Bullar-street, Southampton.

SOUTHAMPTON. ROYAL SOUTH HANTS HOSPITAL. (278 Beds. Recognised for F.R.C.S.) RESIDENT HOUSE SURGEON required immediately. Pre-registration candidates eligible.

Applications, with copies of testimonials, should be forwarded to the Secretary, Southampton Group Hospital Management Committee, Bullar-street, Southampton.

STOKE-ON-TRENT. NORTH STAFFORDSHIRE ROYAL INFIRMARY. SENIOR HOUSE OFFICER (anæsthetics) required; recognised D.A.—recognition F.F.A.R.C.S. applied for. Previous anæsthetic experience desirable but not essential.

Detailed applications to Hospital Management Committee Secretary, Princes-road, Stoke-on-Trent.

STOKE-ON-TRENT. NORTH STAFFORDSHIRE ROYAL INFIRMARY. (455 Beds.) SENIOR HOUSE OFFICER (ophthalmology) required. Recognised F.R.C.S. and D.O.

Applications to Group Secretary, Hospital Management Committee, Princes-road, Stoke-on-Trent.

STOKE-ON-TRENT. NORTH STAFFORDSHIRE ROYAL INFIRMARY. (455 Beds.) HOUSE OFFICER (general surgery) required. Recognised F.R.C.S. and pre-registration.

Applications to Group Secretary, Hospital Management Committee, Princes-road, Stoke-on-Trent.

STOKE-ON-TRENT. NORTH STAFFORDSHIRE ROYAL INFIRMARY. (455 Beds.) SENIOR HOUSE OFFICER (E.N.T.) required. Recognised F.R.C.S.

Applications to Group Secretary, Hospital Management Committee, Princes-road, Stoke-on-Trent, as soon as possible.

STOKE-ON-TRENT. NORTH STAFFORDSHIRE ROYAL INFIRMARY. HOUSE OFFICER (medical with dermatology) required. Pre-registration post, vacant very shortly.

Apply Secretary Hospital Management Committee, Princes-road, Stoke-on-Trent.

STOKE-ON-TRENT. CITY GENERAL HOSPITAL. HOUSE OFFICER (general surgery) required, vacant now. Recognised F.R.C.S. examination, and pre-registration.

Applications to Group Secretary, Hospital Management Committee, Princes-road, Stoke-on-Trent.

STOKE-ON-TRENT (near). GROUNDSLOW HOSPITAL, TITTENSOR. RESIDENT ASSISTANT MEDICAL OFFICER required. Hospital of 110 Beds (male and female) for pulmonary tuberculosis. Post vacant mid-November. Junior Hospital Medical Officer status. House available.

Applications to Group Secretary, Stafford Hospital Management Committee, 13, Foregate-street, Stafford.

STOCKPORT. STEPPING HILL HOSPITAL. (496 Beds.) Applications are invited for the post of SENIOR HOUSE OFFICER (obstetrics and gynæcology), vacant 1st October, 1955. The post is recognised for D.Obst.R.C.O.G., and there are 68 obstetric and 36 gynæcological beds.

Applications, stating age, experience and qualifications, together with the names of 2 referees, to be addressed to the Group Secretary, Stockport and Buxton Hospital Management Committee, 59B, Shaw-heath, Stockport, within 7 days of the appearance of this advertisement.

ST. ALBANS. HILL END HOSPITAL. North West METROPOLITAN REGIONAL HOSPITAL BOARD. Whole-time PSYCHIATRIC REGISTRAR required at above Hospital. Post vacant 1st October, 1955. Successful candidate will be required to work whole-time on the wards, but will be given scope for the care of neurosis cases. Preference given to candidates able to conduct original research or who wish to study for higher qualifications. Hospital may be visited by direct appointment.

Application forms obtainable from, and returnable to, the Group Secretary, Bleak House, Catherine-street, St. Albans, Herts, by 5th August, 1955.

ST. ALBANS (near), HERTFORDSHIRE. NAPSBURY MENTAL HOSPITAL. NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. JUNIOR HOSPITAL MEDICAL OFFICER (full-time) required. Some experience in psychiatry desirable. Candidates may visit by appointment.

Full details to Medical Superintendent immediately.

ST. ANDREWS. CRAIGTOUN MATERNITY HOSPITAL (41 Beds) AND ASSOCIATED ANTENATAL CLINICS. Applications are invited for the appointment of RESIDENT HOUSE OFFICER at the above Hospital as from 1st October, 1955. The post qualifies for pre-registration.

Apply, with references to the Medical Superintendent, East Fife Hospitals Board of Management, 243A, High-street, Kirkcaldy.

ST. HELENS AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of CASUALTY OFFICER in the Senior House Officer grade, at St. Helens Hospital (196 Beds). The post is approved for the 6 months training in casualty work required of candidates for the Fellowship examination of the Royal College of Surgeons.

Applications, stating age, qualifications and experience, and giving 2 names for reference, should be forwarded immediately to N. RICHARDS, Secretary.

Group Office, Whiston Hospital, Prescot.

SWANSEA HOSPITAL, Swansea. (407 Beds.) Glantawe HOSPITAL MANAGEMENT COMMITTEE. Registered medical practitioners are invited to apply for the resident appointment of SENIOR HOUSE OFFICER in the Traumatic and Orthopædic Department of the above Hospital. Vacancy approximately 1st September. The post is recognised under the F.R.C.S. regulations for 6 months casualty training.

Applications, stating age and experience, together with copies of 2 recent testimonials, should be forwarded to the Hospital Secretary.

SWANSEA HOSPITAL, Swansea. (407 Beds.) Glantawe HOSPITAL MANAGEMENT COMMITTEE. Registered medicl practitioners are invited to apply for the appointment of ANÆSTHETIST (Senior House Officer grade) at the above Hospital. The Hospital is recognised under the D.A. and F.F.A.R.C.S. regulations.

Applications, stating age, qualifications, and experience, together with copies of 2 recent testimonials, should be forwarded to the Hospital Secretary.

SWANSEA. MORRISTON HOSPITAL. (501 Beds.) GLANTAWE HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the resident post of SENIOR HOUSE OFFICER in the Neurosurgical Department of the above Hospital. The post affords excellent opportunities for the study for higher degrees.

Applications, together with copies of 2 recent testimonials, should be forwarded to the Medical Superintendent at the Hospital.

WAKEFIELD. THE GENERAL HOSPITAL, Park Lodge-lane. (158 Beds.) HOSPITAL MANAGEMENT COMMITTEE NO. 9 WAKEFIELD A GROUP. RESIDENT SURGICAL OFFICER (Senior House Officer grade) required at the above Hospital. Post vacant from 1st September, 1955. Salary and conditions of service in accordance with national recommendations.

Application should be made to the Group Secretary, 113, Northgate, Wakefield.

WARRINGTON GENERAL HOSPITAL. Applications are invited for the post of RESIDENT SENIOR HOUSE OFFICER (Male or Female) Obstetrics and Gynæcology, which will become vacant on 1st October, 1955. This post is recognised for the D.Obst.R.C.O.G. Scale of salary £745 p.a., less £130 for residential emoluments.

Applications, stating age, qualifications with dates, and details of experience, together with copies of recent testimonials, should be sent to the Group Secretary, Warrington and District Hospital Management Committee, c/o General Hospital, Warrington, Lancs.

WATFORD, HERTFORDSHIRE. PEACE MEMORIAL HOSPITAL. CASUALTY AND ORTHOPÆDIC HOUSE SURGEON (pre-registration). Intermediate or Senior post depending on experience. Required immediately for Orthopædic Unit (30 Beds). The Orthopædic Service is in the charge of a Consultant and Registrar closely associated with a Postgraduate Teaching Hospital.

Applications, with copies of 2 testimonials, to the Administrator.

WELSH REGIONAL HOSPITAL BOARD. Registrar (general medicine), based at Caerphilly District Miners' Hospital, Caerphilly. Subject to review end of first year.

Application forms from Senior Administrative Medical Officer, Temple of Peace, Cathays Park, Cardiff, within 14 days.

WELSH REGIONAL HOSPITAL BOARD.

REGISTRAR (psychiatry), Morgannwg Hospital, Bridgend (all modern treatments, active outpatient clinics, Child Guidance Clinic and Psychological Department). Accommodation available.

SURGICAL REGISTRAR (orthopædics) to serve Cardiff Hospital Management Committee, based at Prince of Wales Hospital, Rhydlafar, near Cardiff (200–300 Beds). Hospital is Regional Orthopædic Centre for South Wales area. Married accommodation available.

REGISTRAR (anæsthetics), Mid Glamorgan Hospital Management Committee. Successful candidate will be based at Neath General Hospital (412 Beds). Hospital recognised for D.A. Resident non-resident.

REGISTRAR (anæsthetics), based at Morriston Hospital, Morriston, near Swansea, to serve Glantawe Hospital Management Committee. Resident non-resident.

Subject to review end of first year.

Application forms from Senior Administrative Medical Officer, Temple of Peace and Health, Cathays Park, Cardiff, within 14 days.

WEST DORSET GROUP HOSPITAL MANAGEMENT COMMITTEE. HOUSE SURGEON (Male or Female) required for the following appointments :—

WEYMOUTH AND DISTRICT HOSPITAL, WEYMOUTH (124 Beds), vacant end of July.

DORSET COUNTY HOSPITAL, DORCHESTER (113 Beds), vacant mid-August.

Both posts are recognised for F.R.C.S. examination and approved for Pre-registration Service.

Applications, stating age, qualifications, and nationality, together with copy testimonials, to Group Secretary, West Dorset Hospital Management Committee, Damers-road, Dorchester, Dorset, immediately.

WIGAN. ROYAL ALBERT EDWARD INFIRMARY. (200 Beds.) SENIOR HOUSE OFFICER in Orthopædic Surgery required.

Applications to Secretary, Wigan Infirmary.

WREXHAM. MAELOR GENERAL HOSPITAL. (591 Beds.) Applications are invited for the post of HOUSE SURGEON at the above Hospital, to commence duties at the beginning of August. The appointment is recognised for the Diploma of F.R.C.S. (Eng. and Edin.) and is a pre-registration post.

Applications, stating age, nationality, qualifications and experience, with copies of 2 recent testimonials, to be sent to the Group Secretary, Maelor General Hospital, Wrexham, as soon as possible.

WREXHAM. WAR MEMORIAL HOSPITAL. (230 Beds.) Applications are invited for the post of HOUSE SURGEON at the above Hospital, to commence duties at the beginning of August. The appointment is recognised for the Diploma of F.R.C.S. (Eng. and Edin.) and is a pre-registration post.

Applications, stating age, nationality, qualifications and experience, with copies of 2 recent testimonials, to be sent to the Group Secretary, Maelor General Hospital, Wrexham, as soon as possible.

WINDSOR. KING EDWARD VII HOSPITAL. Casualty OFFICER required (Senior House Officer grade). Department forms part of Accident Service of Windsor Group ; duties include House Surgeon to E.N.T. and Eye Departments. Previous experience in treatment of acute injuries desirable.

Applications, stating age, qualifications with dates, nationality, and copies of recent testimonials, to Hospital Secretary.

WINDSOR. KING EDWARD VII HOSPITAL. Obstetric AND GYNÆCOLOGICAL HOUSE SURGEON required, Male or Female, for post vacant September. Post recognised for both M.R.C.O.G. and D.Obst.R.C.O.G. not pre-registration. Successful candidate will be resident at Old Windsor Unit of Hospital. Applicants required to be members of a Medical Protection Society.

Applications, stating age, nationality, qualifications with dates and copies of recent testimonials, to Hospital Secretary, by 31st July.

WINDSOR. KING EDWARD VII HOSPITAL. House SURGEON in General Surgery required, Male or Female. Post recognised for F.R.C.S. Preference given to persons seeking pre-registration post. Applicants required to be members of a Medical Protection Society.

Applications, stating age, nationality, qualifications with dates, and copies of recent testimonials, to Hospital Secretary.

WOLVERHAMPTON GROUP.

The Royal Hospital (an Associated Hospital of the University of Birmingham Medical School)

HOUSE OFFICER (general surgery), vacant now. Approved for Pre-registration Service.

HOUSE OFFICER (E.N.T. Department), vacant now.

Apply, with copies of testimonials, to Secretary, The Royal Hospital, Wolverhampton.

WORTHING HOSPITAL, Lyndhurst-road, Worthing. WORTHING GROUP HOSPITAL MANAGEMENT COMMITTEE. Locum RESIDENT SURGICAL REGISTRAR required for approximately 3 months from 15th August whilst present holder is away on a course. F.R.C.S. qualification desirable. Salary at the rate of £17 10s. per week.

Applications, giving details of age, experience, and qualifications, together with copy testimonials, to be forwarded to the Hospital Secretary immediately.

YORK. MILITARY HOSPITAL. (Civilian Wing—60 Beds (28 medical, 32 general surgical).) Required, SENIOR HOUSE OFFICER (resident or non-resident) from 6th August, 1955. The Hospital is associated with the County Hospital (general hospital of 269 Beds). Salary £745 p.a., less £153 p.a. if resident.

Applications, giving age, nationality, qualifications, experience, and names of 2 referees, immediately to the Secretary, York A and Tadcaster Hospital Management Committee, Bootham Park, York.

YORK COUNTY HOSPITAL, CITY HOSPITAL, MILITARY HOSPITAL (CIVILIAN WING). (General Hospitals of 269, 265, and 60 Beds respectively with full Consultant staff.) SENIOR HOUSE OFFICER in Anæsthetics (resident or non-resident), required from 27th July, 1955. Recognised for D.A. Previous experience desirable but not essential.

Applications, giving age, nationality, qualifications, experience, and names of 2 referees, immediately to the Secretary, York A and Tadcaster Hospital Management Committee, Bootham Park, York.

YORK COUNTY HOSPITAL. (Acute General Hospital— 269 Beds with full Consultant staff.) Locum Tenens SENIOR HOUSE SURGEON in Ophthalmology required, 31st July–28th August, 1955. Recognised for Diploma and F.R.C.S.

Applications immediately, giving qualifications, age, experience, nationality, and names of 2 referees, to the Secretary, York A and Tadcaster Hospital Management Committee, Bootham Park, York.

YORKSHIRE. EAST RIDING HOSPITAL MANAGEMENT COMMITTEE.

Westwood Hospital, Beverley, Yorkshire (220 Beds) ORTHOPÆDIC HOUSE SURGEON (first, second, or third post). Offers good opportunity for general experience in busy acute general hospital. Approved pre-registration post. Fully qualified practitioners may apply. Recognised for F.R.C.S.

Apply to Group Secretary.

CHANNEL ISLANDS, JERSEY. GENERAL HOSPITAL. Applications are invited for the post of CASUALTY OFFICER which will be vacant on 1st August, 1955, in the above Hospital. The appointment is for 6 months, but is renewable for a further 6 months. Salary £575 p.a., less £125 for residential emoluments.

Applications to be submitted not later than 6th August, 1955, to the President, Public Health Committee, General Hospital, Jersey, C.I.

MICHIGAN, U.S.A. OAKWOOD HOSPITAL, Dearborn, MICHIGAN. Applications are invited for 1 or 2 year General Practice RESIDENCY in new 230-Bed general hospital 10 miles from Detroit. Excellent facilities. Hospital approved for exchange-visitor programme. Salary begins at $275 per month.

Apply: Director.

NEW YORK, U.S.A. THE DOCTORS HOSPITAL. Applications are invited for the following posts:—

1 RESIDENT HOUSE SURGEON.
1 RESIDENT HOUSE PHYSICIAN.

Duties to commence at a mutually convenient date in the Autumn. The monthly salary will be $300, with free board and lodging and laundry. Selected applicants will be expected to sign a contract for 1 year. Return passage by boat or plane will be paid for by the Hospital. Only post-registration graduates of British Universities who have done their military service or are exempt from it will be considered. Some previous experience in their subject is required.

Applications, giving details of experience, should be sent, together with copies of 2 recent testimonials, to Address, No. 149, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2. Further particulars can be obtained through this address.

Public Appointments

BIRMINGHAM. CITY OF BIRMINGHAM. Applications are invited from registered medical practitioners for the post of ASSISTANT ADMINISTRATIVE MEDICAL OFFICER OF HEALTH for General Purposes. Candidates should hold the Diploma of Public Health. The officer appointed will be required to devote his whole-time to official duties and the appointment will be subject to 1 months notice on either side. The present salary scale is £1250, rising by £50 annually to £1450 p.a. An increased salary scale for this post has been recommended and is under consideration. Medical examination; superannuation scheme.

Applications, with full particulars of qualifications and experience, together with copies of 3 recent testimonials, should be forwarded to the Medical Officer of Health, Council House, Congreve-street, Birmingham, 3, not later than 30th July, 1955.

BIRMINGHAM. CITY OF BIRMINGHAM. Public HEALTH DEPARTMENT. Whole-time ASSISTANT MEDICAL OFFICER (Male or Female) for Maternity and Child Welfare. Applicants should have had experience in work with mothers and children, including a 6-month resident post in a maternity hospital and in a children's hospital. The D.P.H. will be considered an additional qualification. The duties will be mainly in connection with maternity and child welfare as well as the medical aspects of the care of deprived children. Salary £975–£50–£1375 p.a. according to qualifications and experience. Pension scheme; medical examination.

Form obtainable from Medical Officer of Health, Council House, Birmingham, 3. Applications, with 3 recent testimonials, to be returned by 3rd August, 1955.

GLOUCESTERSHIRE COUNTY COUNCIL. Applications are invited for the appointment of ASSISTANT COUNTY MEDICAL OFFICER OF HEALTH (Male). Salary in accordance with the Whitley Council for the Health Services; Medical Council, £975 p.a. rising by £50 to £1375 p.a. Commencing salary will be determined on previous experience. Applicants must be registered medical practitioners and possession of a Diploma or Certificate in Public Health would be an advantage. The post is superannuable and is subject to a medical examination. Must be able to drive and possess a motor-car; travelling and subsistence allowances in accordance with the County scale.

Forms of application with particulars of duties and conditions of appointment may be obtained from the County Medical Officer of Health, Berkeley House, Berkeley-street, Gloucester, to whom completed applications should be sent not later than 12th August, 1955.

GUY H. DAVIS, Clerk of the County Council.

Shire Hall, Gloucester.

NAVY, ARMY AND AIR FORCE INSTITUTES. Applications are invited from general practitioners in the undernoted towns for the appointment, in a part-time capacity, as MEDICAL OFFICERS to this Corporation. Successful applicants would be required to examine and report on the condition of employees of the Corporation who may be referred to them from time to time. Fees for this work will be paid on a scale agreed with the British Medical Association.

Applications, giving full details of qualifications and experience, should be sent to Principal Medical Officer, Navy, Army and Air Force Institutes, Kennington-lane, London, S.E.11. Applicants should not be more than 60 years of age.

The towns for which applications are invited are:—

ENGLAND		WALES
Stafford.	Chester.	Towyn.
Warwick.	Preston.	Swansea.
Hereford.	Worcester.	
Wilmslow (Manchester).		

PLYMOUTH. CITY OF PLYMOUTH. Applications invited for the post of ASSISTANT MEDICAL OFFICER OF HEALTH AND SCHOOL MEDICAL OFFICER from registered medical practitioners, Male or Female, with at least 3 years experience since qualification. D.P.H. or D.C.H. desirable. The post is superannuable and subject to medical examination. Salary scale £975–£50–£1375 p.a. Appointment terminable by 3 months notice on either side. The work will be primarily in the School Health and Maternity and Child Welfare Departments, but other duties of a general public-health nature may be allocated by the Medical Officer of Health.

Forms of application are not provided. Applications to the undersigned, stating age, qualifications and experience, together with the names and addresses of 2 referees, in an envelope endorsed "Assistant Medical Officer of Health," not later than 6th August, 1955. T. PEIRSON, Medical Officer of Health.

"Seven Trees," Lipson-road, Plymouth.

POOLE. BOROUGH AND COUNTY OF THE TOWN OF POOLE. COUNTY OF DORSET. Joint Appointment. Borough: Deputy Medical Officer of Health. County: Assistant Medical Officer. Applications are invited from registered medical practitioners holding the Diploma in Public Health for full-time service in the joint appointment of DEPUTY MEDICAL OFFICER OF HEALTH for the Borough of Poole AND DEPUTY PORT MEDICAL OFFICER (4/11), SCHOOL MEDICAL OFFICER, Poole excepted District (3/11), AND ASSISTANT COUNTY MEDICAL OFFICER (4/11). Salary: minimum £1195 5s. 8d.; maximum £1579 16s. 7d. Car allowance.

Full particulars and forms of application may be obtained from the Town Clerk, Poole, Dorset. Closing date 8th August, 1955.

WILSON KENYON, Town Clerk, Poole.

C. P. BRUTTON, Clerk of the County Council, Dorchester.

SALOP. COUNTY OF SALOP. Mixed appointment of MEDICAL OFFICER OF HEALTH for the Ellesmere Urban and Rural, Wem Urban and Rural and Whitchurch Urban Districts AND ASSISTANT MEDICAL OFFICER of the Salop County Council. The Salop County Council and the Councils of the above-named County Districts, the latter having a total population of about 32,000, invite applications for the mixed full-time appointment of Medical Officer of Health for the 5 County Districts and Assistant Medical Officer of the County Council. The apportionment of service is 7/11ths to the County Council and 4/11ths to the Councils of the County Districts. The salary payable will be within the "mixed appointments" scale of £1374 rising to £1741 in accordance with the awards of the Industrial Court; the commencing salary will be according to experience and qualifications. The successful candidate will be required to provide a car. Travelling and subsistence expenses will be paid in accordance with the County Council scales. For a limited period a separation allowance may, in appropriate cases, be paid.

Forms of application and copies of further particulars and conditions of service may be obtained from the undersigned. Applications to be sent in not later than 1st August, 1955.

G. C. GODBER, Clerk, Salop County Council.

Shirehall, Shrewsbury, 9th July, 1955.

LONDON COUNTY COUNCIL. Applications are invited from registered medical practitioners for appointment as ASSISTANT PRINCIPAL MEDICAL OFFICER in the Public Health Department. Inclusive salary £1425–£50–£1675; no emoluments. Principal duties in the first instance connected with the Housing Acts with particular reference to slum clearance.

Application forms from Medical Officer of Health (d.1.), The County Hall, Westminster Bridge, S.E.1, returnable by 6th August. (1147)

MINISTRY OF HEALTH. Senior Medical Officer (Pharmacologist). The Civil Service Commissioners invite applications from registered medical practitioners (Men and Women) for this permanent post. Candidates must be aged 28 or more on 1st July, 1955. Interviews in London. Candidates must be medical graduates with special knowledge of pharmacology and of the manufacture and testing of biological products. Duties concerned with administration of the Therapeutic Substances Act and Regulations controlling the manufacture for sale of biological products and advisory duties. Salary (London) £2200. Non-contributory pension and gratuity.

Further information on this post and application form from Secretary, Civil Service Commission, 6, Burlington-gardens, London, W.1, quoting 4489/55. Application forms to be returned by 6th August, 1955.

NATIONAL COAL BOARD. North-Eastern Division. Applications are invited for the post of MEDICAL OFFICER in the Wakefield Area of the North-Eastern Division. Candidates should have experience in the field of preventive and industrial medicine and a knowledge of the coalmining industry will be an advantage. The work will include making underground visits to collieries. Salary, according to qualifications and experience, will be within the range of £1400–£2150 p.a.

Detailed applications, giving the names of 2 referees, should be sent to the Divisional Establishments Officer, National Coal Board, North-Eastern Division, Ranmoor Hall, Belgrave-road, Sheffield, 10, to arrive not later than Monday, 15th August, 1955.

WARWICKSHIRE COUNTY COUNCIL. County Medical Officer of Health's Department. Applications are invited from registered medical practitioners for the permanent appointment of ASSISTANT COUNTY MEDICAL OFFICER OF HEALTH (Male or Female). Preference will be given to those holding the D.P.H. or D.C.H. and with previous experience. Salary and conditions will be in accordance with the Whitley Council. The candidate will be required to provide a motor-car in the performance of duties, for which Whitley Council scale allowances are payable.

Further particulars (including details of area and duties) and application forms may be obtained from the County Medical Officer of Health, Shire Hall, Warwick. Closing date for applications is 6th August, 1955.

L. EDGAR STEPHENS, Clerk of the Council.

Shire Hall, Warwick.

General Practice

For an Executive Council post (England and Wales) apply on form E.C.16A obtainable from the council. Mark envelope "Vacancy."

FARNHAM, SURREY. Applications invited for retirement VACANCY (urban). List about 2000. Residence and surgery available for purchase. Intermediate area. Applications on Form E.C.16A to reach the undersigned on or before 5th August, 1955.

S. H. BENNETT, Clerk, Surrey Executive Council.

187, Ewell-road, Surbiton, Surrey.

KINGSTON-UPON-THAMES, SURREY. Applications invited for death VACANCY (urban). List about 3800. Residence and surgery may be available. Intermediate area. Applications on Form E.C.16A to reach the undersigned on or before 5th August, 1955.

S. H. BENNETT, Clerk, Surrey Executive Council.

187, Ewell-road, Surbiton, Surrey.

WOOD GREEN. Applications invited for Vacancy. List at present approximately 1350. Intermediate area. Premises will be available. Apply on E.C.16A before 30th July, 1955, to—

G. MADDEN, Esq., Middlesex Executive Council.

Gloucester House, Gloucester-gate, London, N.W.1.

Hospital Services : Non-Medical Appointments

BIRMINGHAM. THE UNITED BIRMINGHAM HOSPITALS. THE GENERAL HOSPITAL. Applications are invited for the appointment of a BIOCHEMIST (Basic grade). Candidates should possess a B.Sc. Degree with Honours in Biochemistry or Chemistry or equivalent qualification.

Applications, with the names of 2 referees, should be sent to the House Governor, The General Hospital, Birmingham, 4, within 2 weeks of this publication.

Miscellaneous

To non-professional posts the Notification of Vacancies Order 1952 applies.

The Republic of Indonesia. Applications are invited from qualified doctors for posts in general practice in medicine in the Republic of Indonesia. Successful candidates will be appointed for 3 years. Return fare will be paid and also for wife. —Applications, giving date of birth, qualifications, experience and names of 3 referees, should be made to the Cultural Attaché, Embassy of the Republic of Indonesia, 38, Grosvenor-square, London, W.1.

Applicants for posts requiring testimonials copied or duplicated should communicate with MANTON SECRETARIAL SERVICE LTD., 98, Victoria-street, S.W.1 (Phone : VICtoria 0141), who are specialists in this kind of work.

2 Medical Officers are required by the United Kingdom Atomic Energy Authority for posts : (*a*) at the Industrial Group Headquarters, Risley, near Warrington, Lancs, where the Officer will be required to carry out clinical duties and assist the Group Medical Officer in the collection of information in the field of radiation medicine ; (*b*) at the new establishment at Dounreay in Caithness, Scotland. Experience in industrial medicine, outpatient and general practice ; a Diploma in Industrial Health, or a higher medical qualification will be advantageous. The Officers appointed will be required to spend some time at existing establishments of the Authority, principally Windscale Works, Cumberland, prior to taking up their appointments at Risley early in 1956 and at Dounreay towards the end of 1956. The salary scale for these posts is dependent, to some extent, on age, the maximum of the scale at present is £2200 p.a. Housing accommodation will be available within a reasonable time for selected candidates, if married. All new entrants under the age of 55 automatically join the Authority's contributory pension scheme.—Send postcard for application form to UNITED KINGDOM ATOMIC ENERGY AUTHORITY, Risley, near Warrington. Ref. 997 must be quoted.

Slough Industrial Health Service. Applications are invited for the posts of :—

(1) Medical Officer with effect from 1st October, 1955. General duties as works medical officer, and will be required to assist in the Rehabilitation Service, and in teaching. Previous experience in industrial medicine, general practice and physical medicine an advantage. Commencing salary in the neighbourhood of £1500 p.a. with car allowance to a maximum of £150. The post is superannuated. Further details can be obtained from the Medical Director.

(2) Resident Assistant Medical Officer with effect from 1st September, 1955. Candidates should be single, Male, and have had casualty experience. Duties entail supervision of the Emergency Casualty Service and acting as works medical officer to a large number of small firms. The post offers opportunities of gaining general experience in industrial medicine. Salary £800 p.a. with full residential emoluments. Car allowance to a maximum of £150.

Applications for either of the above posts should be sent to the Medical Director, Slough Industrial Health Service, Farnham-road, Slough, Bucks, with the names of 3 referees, not later than 30th July.

Gold Coast. Wanted for Achimota Hospital, Accra, School Medical Officer to run health service for Secondary Boarding School of 400 African boys and 200 African girls, African and European staff, School employees, their wives and children : also to act as Assistant Medical Officer to University College of Gold Coast. Very general medical practice ; no surgery. Candidates must possess medical qualification registrable in United Kingdom. Appointment (subject to 2 years probation) on permanent basis with pension or short-term contract with gratuity. Salary scale £890–£30–£950 and £1000–£40–£1280 plus overseas pay £275–£350. Starting salary according to qualification and experience. Quarters and basic furniture provided. Free passages both directions for officer, wife, and 3 children up to age 13. 8 weeks home leave taken annually.

Further information concerning nature of work (and application forms) obtainable from Miss P. M. SHEPHERD, Achimota School London Office, 2, Eaton-gate, London, S.W.1 ; or the HEADMASTER, Achimota School, Accra, Gold Coast.

Medical Officer required for Tea Estate Practice in East Pakistan. Good salary and allowances. Provident fund and non-contributory pension fund. House and car provided.—Reply stating age and qualifications, &c., write 1571 WM. PORTEOUS & CO., Glasgow.

S.R.N. 29 years, capable, seeks full/part-time post, doctors consulting-rooms. 5-day week preferred.—Address, No. 152, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

Medical Publisher requires experienced Secretary from 2 to 5.30 P.M. Monday–Friday.—Phone : LANgham 4255.

Suffolk Coast. Unique position, suitable for nursing-home. 12-roomed freehold house, all amenities. Previously Doctor's residence. Executor's sale. Moderate price.—Address, No. 153, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

Modern superficial X-ray therapy set, filters, applicators, &c. Little used. Excellent condition. Price ex London.—X-RAY EQUIPMENT CO., Merthyr Works, Barnes, S.W.13.

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Typewriting and Duplicating. First-class work at moderate prices by experienced medical typists.—SYBIL RANG, 21, Heath-street, Hampstead, London, N.W.3 (HAM. 5329/0504).

"Pregnancy Diagnosis by the Xenopus Method," 24-hour service. Send specimen of urine and £1 1s. fee. Hæmatology, Biochemistry, Flame Photometry.—WELBECK BIOLOGICAL LABORATORIES, 26, Park-crescent, Portland-place, W.1. (MUSeum 5386–7).

Austin. The New Show Models A.30, A.40, A.50 and A.90. Limited number of orders now acceptable from proven essential users for delivery ahead.—Demonstrations, easy terms, brochures, application forms on request, from H. A. SAUNDERS LIMITED, Austin House, 140–144, Golders Green-road, Golders Green, London, N.W.11.

Vesalius—The Illustrations from his Works. 250 pages, including 100 pages of illustrations, with biog. study and annotations. 12 in. × 9 in. Published at £4, offered at £2 10s., postage 1s. 6d., from the CHURCH STREET BOOKSHOP, 57, Kensington Church-street, London, W.8.

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14/5